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Tunnelling.

PUBLIC attention has been directed more largely than ever during recent years to the subject of tunnelling, owing to the necessity experienced in all great cities of the world for improved means of communication, sometimes from one part to another of a crowded centre, and at others from the busy centre to outlying districts. At one time work of this particular description was confined to the city of London, but it has now spread to Glasgow and to several cities on the Continent and in America. As the railway system may be properly regarded as the primary cause of the extensive tunnelling operations inaugurated during the last century, so it may be held responsible for more recent developments. Not content, as formerly, to burrow merely through level ground, hills, and mountains, the aim of the engineer now extends to the construction of deep-seated passages that make light of the obstacles hitherto presented by natural irregularities of the surface, buildings, rivers, estuaries, and seas. In the present day tunnelling is almost invariably executed for strictly utilitarian purposes, whereas in former times tunnels were fashionable as burial-places for persons of rank and position, who were able, without inconvenience, to expend the necessary thousands in constructive work, the currency being then represented by the lives of slaves. During the Middle Ages tunnels were generally formed for military objects, or for securing the safety of wealthy people in those uncomfortable times when the sword was more powerful than the pen. Of course, as we all know, the Romans distinguished themselves in the making of tunnels for useful purposes, and their methods were not greatly improved upon until the employment of explosive agents became general.

Few works have hitherto been published descriptive of modern practice in tunnelling, and there is, therefore, ample justification for the treatise recently produced by Mr. Prelini and Mr. Hill, of New York.* The other chief works on the subject are Drinker's "Tunnelling," published in New York some years ago, and Simm's and Clarke's "Practical Tunnelling," of which the fourth edition was issued in London some five years back. Both of these are masterly expositions of tunnelling work, although neither of them is entirely suitable for a beginner or for the busy man who wishes to acquire general information with a minimum expenditure of time. Mr. Prelini, the originating author of the present treatise, experiencing the want of a text-book of moderate size and price, proceeded to enlarge his own lecture notes, written for use at Manhattan College, and with the co-operation of Mr. Hill, editor of the *Engineering News*, to produce the volume now occupying our attention. In the course of an interesting and condensed review of the development of tunnel building the authors usefully mention the directions in which electricity is destined to be employed in future work. Electricity is undoubtedly one of the most convenient forms of power available to engineers of all classes, and we quite agree that its application to hauling, hoisting, excavating, drilling, and ventilating machinery is capable of considerable extension.

Before any survey of new territory can be satisfactorily commenced it is necessary to know exactly what has to be done, and in some cases a preliminary survey, or reconnaissance, is desirable so that the character and magnitude of the task may be more adequately realised. A similar operation may be conveniently applied as a preliminary to our examination of the ground covered by the treatise with which we are at present concerned. At the commencement, we find that the authors have duly recognised the importance of furnishing readers with sufficient preparatory information to aid the comprehension of the details and principles that follow. After the disposal of introductory matter, various methods of tunnelling are discussed in detail, and the book concludes with a series of four chapters on accidents, repairs, ventilation, and cost.

In the introduction a tunnel is defined as "an artificial gallery, passage, or roadway, beneath the ground, under the bed of a stream, or through a hill, or mountain." We are sorry to say of this definition—evidently taken from the "Century Dictionary"—that it is not strictly accurate in characterising any passage beneath the ground as a "tunnel." In the first place, the passage must be horizontal to justify the appellation, for, if vertical, it is termed by engineers a "shaft"; in the second place, the definition loses sight of the distinction between tunnelling proper and the cut-and-cover method, which produces a "covered way" rather than a "tunnel." It may, no doubt, be convenient to use the term conversationally in the sense suggested by the authors, but students should be taught to discriminate between different kinds of underground work. Again, the dictionary definition is not sufficiently comprehensive, for, whilst referring specifically to the case of a stream, it does not notice the possibility of forming a tunnel beneath any other body of water. These little deficiencies serve to show that general books of reference cannot always be safely followed by writers of purely technical works, in which the most precise terminology is invariably to be desired.

The first preliminary consideration placed before the reader is the choice between a tunnel and an open cut, and, to quote the words of the authors, "the answer to this question depends upon the comparative cost of construction and upon the relative commercial and structural advantages and disadvantages of the two methods." These factors are discussed briefly, but sufficiently to enable any one to apply them to the determination of any particular case. In general practice an open cut is seldom adopted for any great distance if a vertical depth of more than 60 ft. should be required, but this does not constitute an absolute rule, as the character of the ground must always be taken into account. We may

* "Tunnelling." A Practical Treatise. By Charles Prelini, C.E., with Additions by Charles S. Hill, C.E. (London: Crosby Lockwood & Son; New York: D. Van Nostrand Co. 1901.)

also add that the engineer should make it his study to avoid the necessity for tunnels as far as possible in any portion of a line of communication. Having once decided to build a tunnel, the engineer must ascertain the nature of the strata through which it will pass. For this purpose the diamond rock drill is recommended by the authors as affording most efficient aid. This appliance possesses the advantage of boring an annular hole, thus furnishing for examination a core which shows the character, position, and thickness of the different strata penetrated. A sufficient number of borings along the proposed course of the tunnel will frequently render unnecessary the adoption of other trial operations, but it is often quite impracticable to make such borings owing the height of a mountain ridge or to other conditions. For the guidance of the engineer in such cases the study of geological characteristics is recommended by the authors. As a matter of fact, information of this nature is frequently more valuable than that obtainable from actual borings. A geological survey is especially useful for the settlement of preliminaries, and trial borings may afterwards be made to prove the accuracy or for the correction of theoretical deductions before tunnelling is commeuced in earnest. The discussion of geological surveys in Chapter I. includes some very useful notes on the different rocks and soils encountered, on their merits and demerits from the point of view of a tunnel builder, and on the presence and pressure of water in such strata. Chapter II. deals with methods of setting out tunnels, and the forms and dimensions of their cross sections. For ranging and setting out the centre line, we are told that an ordinary theodolite is sufficient for all practical purposes. This does not seem good advice, as it is highly desirable that the instrument should be available for ranging one continuous line in two opposite directions from a station. In all other points the general practice is clearly and intelligibly set forth, yet without going into such minute details as belong more appropriately to a manual on surveying.

The forms and dimensions of cross-section are of much importance, and the form for adoption in any particular case must depend upon the pressures to be resisted; these being necessarily affected by the nature of the material penetrated by the tunnel. Mr. Prelini has here resisted a very obvious temptation to enter upon a mathematical demonstration, and has confined his remarks to a general explanation of the causes leading to the employment of the forms of cross-section in most frequent use; namely:—A section with arched roof and vertical side walls for hard rock; an elliptical section for softer materials; and a circular section for quicksands and mud. The elliptical form with an inverted arch at the floor is largely employed, the invert being intended to protect the side foundations from injury by horizontal pressure of the earth. In mentioning an important exception to the ordinary practice, the authors have evidently no thought of London in their minds when they say that in some of the underground city rapid-transit railways built of late years, a rectangular or box section is employed. Readers of the English edition will probably agree with us in thinking that the work would be a little more complete if the tubular form of section were also mentioned in this connexion. Some comment as to the shape suitable for rock tunnels requiring no lining could also be included with advantage. For instance, in the case of igneous rock, a section of any form convenient for traffic can be employed, but the elliptical with a level floor is most usual. It is implied that a pointed arch is generally desirable in stratified rocks, and it might be added that a flat roof may be permissible if the rock formation is in thick layers with few natural joints. A necessary caution is given in the paragraph dealing with sectional dimensions, that the deformation of the lining masonry must be duly considered. Although the whole structure may not sink more than 3 or 4 in., yet allowance must be made for movement of the side walls towards each other, and for the settling of the roof arch. These matters are of considerable importance, and we are glad to see them mentioned.

The next six chapters continue in a general way the discussion of preparatory information. Thus, attention is devoted to excavating and hauling appliances, and to methods of excavating, timbering, and lining tunnels. Excavating machines are not treated in an entirely satisfactory manner in Chapter III., for no mention is there made of the various shields employed, in Europe and in America, for the driving of tunnels. One of the functions of a shield is clearly to perform a part of the excavating work, and some such appliances are provided with auxiliary apparatus for completing the excavation and for the removal of material. Under the circumstances it seems a little inappropriate to say that "the most recent attempts to use excavating machines in soft ground. . . . must be classed as experiments rather than as examples of common practice." Rock drills receive more adequate notice, although the reader will not obtain full information as to details and methods of application until he has arrived at a further chapter on the subject, which for some reason is inserted in that section of the treatise dealing with methods of tunnelling. After considering the different forms of explosives and the manner in which they are employed, the authors pass on to discuss "General Methods of Excavation, Shafts, and the Classification of Tunnels." A good deal of necessary information on these subjects is given in very compact form, and the tabular classification at the conclusion of the chapter is well worthy of careful notice, as it serves to prevent confusion when different classes of tunnels are under subseqnent treatment. One blemish that must be mentioned is the inclusion of "tunnels under or on a river bed" under the head of "submarine tunnels," and the exclusion therefrom of tunnels formed beneath the sea. The term "sub-aqueous" might appropriately be employed to cover all types of tunnels under water, and we believe it is to be found in American as well as in English dictionaries.

In opening the subject of "Timbering or Strutting Tunnels," attention is wisely directed to the great care necessary in respect of design and execution, as well as to the desirability of using timber of elastic nature so that warning of approaching collapse may be afforded. Hard woods somewhat resemble cast iron in resisting until the last moment, and in giving way suddenly under the breaking load; moreover, they are of greater weight, and thus entail additions to the cost of labour and other expensive items that may be avoided by the employment of softer and lighter woods. A very complete description of the different modes of supporting headings and shafts in rock, and in loose materials, will be found in this chapter, and amongst the most interesting of the illustrations are those of the longitudinal and transverse poling board systems, and forms of strutting for treacherous materials. Some practical details as to the quantity and dimensions of timber required for the support of headings, tunnels, and shafts, ought to be of considerable service to the student. Timbering for the full section of a tunnel is briefly described, but the absence of diagrams somewhat detracts from the value of the letterpress. The concluding part of the chapter is occupied with references to iron strutting for tunnels and their auxiliary works. Perhaps the most interesting form of construction here mentioned is the sinking of shafts in soft ground by the aid of cast-iron segmental rings. The shaft is sunk in a manner similar to that adopted in brick-lined shafts where a "drum-curb" is employed for supporting the ring of brickwork. Instead of the drum-curb, a cast-iron ring is used having a cutting edge, and successive rings are added to form the permanent shaft lining as the work of sinking progresses. Only the briefest explanation is given by the authors of this extremely useful class of work, which is specially to be recommended in all cases where interference with underground springs might be detrimental to the foundations of buildings, and we may remark in passing that it has invariably been adopted in connexion with the low-level railways constructed during recent years in London. After the interpolation of two chapters relating to "Methods of Hauling in Tunnels" and "Types of Centres and Moulds," the discussion of internal supports is resumed, with special reference to the permanent lining of tunnels. This important subject is somewhat lightly dealt with, although the different methods are sufficiently described to impart a fair amount of general knowledge.

Chapter IX., on "Tunnels through Hard Rock," is largely occupied by a discussion of the machinery and appliances used for construction of tunnels in such strata. Recent experience fully justifies the remark that "the present high development of labour-saving machinery for excavating rock renders this material one of the safest and easiest to tunnel of any with which the engineer ordinarily has to deal." Machinery of the kind, however, requires considerable power, which has often to be transmitted to great distances, and has always to be applied to the tools with due regard to economy. At present the transmission of power is almost entirely effected by compressed air or hydraulic pressure, and it is to be hoped that electric power transmission may soon become generally available. Some further observations upon engineering plant are contained in Chapter XII., and it is by no means clear why the two descriptions should be separated. Possibly the authors may suppose the reader will not be able to grasp the information contained in the latter chapter until the intervening matter has been studied. As a matter of fact, however, there is nothing at all difficult of compre-

hension, and it is both inconvenient and confusing to have a subject split up and scattered about in different parts of a book in this manner. On the topic of excavation we find two methods are described of driving "the advanced drift or heading." It will be observed that the words "drift" and "heading" are used by the authors as synonymous terms, and yet a little later the following passage occurs:—"The Mont Cenis and Simplon tunnels are selected as examples of rock tunnels driven by a drift, and the St. Gothard and Busk (U.S.A.) tunnels as examples of rock tunnels driven by headings." As this book is ostensibly written for students, it is not unreasonable to suppose that some perplexity will result from this implied axiom, that things which are equal to the same thing are *not* equal to one another. We now look for some description of "excavation by headings," but find none, although later on, under the title of "excavation by drifts" the method is described without being anywhere clearly defined. Turning over some thirty pages, we accidentally encounter the heading "excavation by drifts," and here curiously enough is found a description of "excavation by headings." Finally, quite at the end of the section devoted to "Tunnels through Hard Rock," is found a paragraph where a "drift" is defined as an advance gallery opened along the floor of the tunnel, and a "heading" as a gallery coinciding with the upper part of the tunnel section. Definitions are always desirable at the outset, especially when distinctions are implied that are not universally recognised. Apart from these comments there is not much to find fault with in the chapters on "Tunnelling through Hard Rock." There is a good account of the Mont Cenis Tunnel, and a diagram clearly showing the sequence of excavation. A lengthy abstract from a paper read by Mr. Fox before the Institution of Civil Engineers on the Simplon tunnel, forms instructive reading, and the accompanying sketches add to its usefulness.

In Chapter XIII. the discussion on "Excavating Tunnels through Soft Ground" is commenced. This material includes many different grades, from stratified soft rock to the most unstable sands and clays, and the authors are justified in saying that if the easy and difficult materials be classed together the excavation of tunnels through soft ground is the most difficult task that confronts the engineer. Sometimes operations can be conducted with comparative facility, while at others uncertainties and obstacles occur which render the work more interesting to the engineer than to the contractor or others who may have to pay the bill. In the book before us, the Belgian, German, English, Austrian, Italian, and "quicksand" methods are grouped together in four consecutive chapters, permitting of ready comparison. The first five of these modes differ chiefly in the order in which the details of work are undertaken, in the number and dimensions of the headings, and in the forms of strutting employed. Quicksand methods naturally include tunnelling by the pneumatic shield, but no hint of this fact is vouchsafed by the authors beyond the statement that the shield system of tunnelling is, for the present, left out of consideration. If the reader institutes an industrious search he will ultimately find a full description of shield-driven tunnels under dry land in the chapters headed "Submarine Tunnelling." The Belgian and German methods are carefully discussed, and their essential characteristics are clearly shown by the aid of diagrams. One great disadvantage in each instance is the fact that the invert is not built until the side walls have been finished, and there is consequently always a danger of distortion by reason of lateral earth pressure. Some notes upon accidents and repairs serve to emphasise the undesirable features of these modes of tunnelling. The German system is more logical than the Belgian, and having been adopted in connexion with the Baltimore Belt Line tunnel, it is the subject of rather extended notice. The most advantageous feature appears to be in the initial excavation of an annular gallery, in which the side walls and roof are built before the centre core is removed. Thus an excellent support is secured for the strutting and the roof centres. Apart from the inconvenience and expense caused by the narrowness of the spaces available for hauling, the German method is fruitful in mishaps, and the records of the Baltimore tunnel are conclusive on the point, as the following brief summary will show:—The masonry lining flattened at the crown and bulged at the sides; there was sinking of the street surface varying from 1 in. to 18 in.; water and gas mains were damaged and in some instances had to be reconstructed; and at one point along the tunnel the surface settlement caused the collapse of an adjacent building. This comprehensive experience may serve as something more than a suggestion that the German mode of work is not likely to commend itself to municipal authorities in this country, especially in the vicinity of historic buildings.

In Chapter XV., the English method of tunnelling through soft ground is the subject of discussion. As stated in the treatise, the distinctive features of the system are the excavation of the full tunnel section at once, the use of longitudinal strutting, and the alternate execution of excavation and masonry work. It ought to have been added that the masonry is commenced in a common-sense way by the construction of the invert. The authors do not appear to favour the English method as a whole, though they admit that the mode of strutting has gained particular favour in America, and is commonly employed there "even when the mode of excavation is distinctly German or Belgian in other respects." We are told that the English method has gained unusual popularity in this country "owing to the general prevalence of comparatively firm chalks, clays, shales, and sandstones," and that in its entirety it "is confined in actual practice pretty closely to the country from which it receives its name." As there is no American method of tunnelling, it might be inferred from these comments that engineers in the United States prefer the Continental methods, whose defects are so clearly demonstrated in the treatise, were it not for the subsequent and somewhat contradictory statement that our own system "has been used in building the Hoosac, Musconetcong, Alleghany, Baltimore and Potomac, and other tunnels in America." Coming to details, we find the mode of procedure is fairly well explained, and due recognition is given of the fact that the method is applicable to "loose soils and very loose soils," as well as to the firm materials previously suggested as the elements chiefly contributing to its popularity. The description of strutting is correct, so far as it extends; and if the arrangement of raking-props and poling-boards, as commonly used, were included, it would be fairly complete. Remembering that a fully-detailed and illustrated account of the Baltimore Belt tunnel was given, serving—perhaps unintentionally—as an awful example of the German method as practised in America, it might have been expected by the open-minded reader that some adequate notice would be included of a typical work constructed according to the English method. If American data were not available to the writers, plenty could have been obtained from British sources. One of the most successful examples is the railway tunnel under the Metropolitan Cattle Market, where the surface subsidence in open ground did not exceed 3¼ in., and under buildings was only from 1 in. to 1¾ in., several heavy buildings being undermined without the slightest injury. Such a record as this is certainly of interest to engineering students, whatever may be their nationality. When adverting to the Austrian method, the writers make the remark that whilst in some respects its principle is similar to the English, "the construction of the invert last exposes the side walls to the danger of being squeezed together, causing a rotation of the arch as in the Belgian method of tunnelling." In justice to Austrian engineers, it should here be observed that in treacherous soils the practice of building the invert first is usually followed. A chapter devoted to the special methods sometimes adopted in treacherous ground is well worthy of study. Of these the Italian system consists in excavating the bottom half of the section by means of successive drifts, after which the invert and a portion of the side walls are built. The space is then refilled, and the upper half of the section is excavated, when the remaining part of the side walls and the roof arch are built, and, lastly, the lower part of the tunnel is cleared of filling. Several serviceable diagrams and sketches are included to make clear the successive stages of the Italian mode, of which the chief disadvantage is excessive cost, practically limiting its employment to works of comparatively small section.

Quicksand tunnelling, as the authors remark, can be performed by modifications of other methods, the object being to drain away water from the tunnel and to hold back the particles of sand by means of timber lining. We have looked, but in vain, for any expression of opinion in this chapter that the process of draining away water from the subsoil should never be attempted in the vicinity of buildings. This is an undesirable omission from a work intended to instruct the rising generation. Here is the very place for a brief reference to the advantages afforded by the pneumatic-shield method. As a conclusion to the chapter, a short mention is made of the pilot method which was adopted in the uncompleted Hudson River tunnel. Compressed air was there used to keep back silt and water, and to prevent injury to the iron tube forming the pilot heading. Further details of this interesting work would be instructive to student readers.

Chapter XVII. on "Open-Cut Tunnels" is full of valuable matter, especially to those who are directly or indirectly concerned

with the essentially modern problem of traffic accommodation in cities. In the opening portion of the chapter, three methods of work are outlined, the single and parallel longitudinal, and transverse, trenches. Single cuts to the full width of the subway section are not suitable for municipal works, because they generally involve the entire interruption of traffic in the streets traversed. The parallel mode of excavation, as recently followed in the case of the Paris Metropolitan railway, permits one half of the roadway to be open for traffic during the continuance of operations; and the third method, as exemplified by the Boston Subway, does not necessarily interfere with traffic at all. Reference is also made to the forms of construction somewhat paradoxically termed in the treatise "Tunnels on the Surface." Work of this kind is no doubt occasionally necessary, especially abroad, and the authors are wise in mentioning it, although they might perhaps have found a more appropriate designation. The remainder of the chapter is occupied with an excellent discussion of tunnels under city streets, which will thoroughly repay careful perusal. It is highly probable that the low-level subway will not be the only type of underground passage to provide for the present and future requirements of the metropolis. Tunnels near the surface possess many advantages, and their construction beneath the chief thoroughfares would permit the establishment of readily-accessible electric tramways, besides enabling the authorities to deal with the troublesome question of gas, water, and other conduits. There is much valuable and essentially modern matter in the descriptions of the Boston Subway and the New York Rapid Transit Railway. Both of these important undertakings are fully considered and well illustrated in the treatise before our notice.

Chapter XVIII. resumes the interrupted subject of tunnelling proper, and is devoted to so-called "Submarine Tunnels." As a preliminary to such an undertaking, the authors properly emphasise the necessity for ascertaining the character of the material in which operations will be conducted. Investigations of the kind proposed cannot put the engineer in a position to do much more than to prophesy, more or less accurately, what will be the nature of the difficulties awaiting his attention, and it not infrequently happens that strata of soft or treacherous soil are encountered of which no indication has been afforded by preliminary investigation. The Milwaukee Water Supply tunnel and the East River Gas tunnel are cited as examples of "submarine" tunnels begun in firm soil, that passed into material of treacherous character after the work had proceeded for some distance. In the treatise the following classification of so-called submarine tunnels is adopted:—(1) Tunnels in rock, or very compact soils; (2) tunnels in loose soils; (3) tunnels on the river bed; (4) tunnels partly in firm soil, and partly in treacherous soil. In the first place, we must point out that the title of the chapter, apparently, compels the authors to omit the Central London Railway from mention, presumably because that work does not pass beneath a river, and, therefore, is not "submarine." Tunnels of Class 1, being driven by any ordinary method, require no special mention. Those of the second class may be driven by shields, by the aid of compressed air, or by shields and compressed air together, whilst those placed in Class 4 hardly constitute a distinct type, and are to be dealt with as the variations of the material demand. The methods necessary for tunnels of Class 3 are distinctive, and involve the use of cofferdams or caissons, as may be most suitable for individual cases. The four chapters on "submarine" tunnelling are of considerable interest and value, and contain much admirably expressed information upon modern tunnelling practice, including details relative to the Severn tunnel, the East River tunnel, New York; the Van Buren-street tunnel, Chicago; and the Milwaukee tunnel. The fourth chapter of the series includes a well-written historical sketch of the shield system; diagrams of the shields employed in the construction of the Thames tunnel, and what is termed "London Tower" tunnel; as well as detailed drawings and descriptions of the more modern appliances adopted for the City and South London Railway, the St. Clair River tunnel, the Blackwall tunnel, the Clichy sewer, and of the roof shield for the Boston subway.

Of actual excavating processes there is now nothing more to be said, but the concluding chapters of the volume are quite as important as those by which they are preceded. The first deals with "Accidents and Repairs" in tunnels, during and after construction, a subject that is carefully and thoughtfully treated; the second, on "Relining Timber-lined Tunnels with Masonry" is equally deserving of commendation, though it is more applicable to the reconstruction of American railway tunnels than to work in this country. The fourth chapter is devoted to the vital questions of "Ventilation and Lighting," and might have been extended with advantage. The final chapter on "The Cost of Excavation and Time Required" is based entirely on American and Continental records. That there should be no British data on these points in a work courting the support of readers in this country seems to be a little unfortunate, because students are not afforded the means of making comparisons that would be useful in a particularly practical sense.

Regarding the work as a whole, it may be justly considered as a praiseworthy and successful effort to place on record in a readable style all the distinguishing characteristics of tunnelling methods practised in the present day. The treatment throughout is descriptive rather than mathematical, and those requiring general information on this highly important subject will find it presented in a thoroughly practical and intelligible form.

NOTES.

Municipal Trading.

The address last week of the Hon. Horace Porter, the United States Commissioner in Cuba, to the London Chamber of Commerce, on the subject of municipal trading, was interesting as being the opinion of a disinterested observer of affairs in England. Mr. Porter is much struck with the apparent want of system which prevails in this country. He finds the London County Council with no authority over the water supply, but carrying on in part of the town the business of a tramway company. The same contradictions he notes everywhere, and more especially the curious fact that the telephone system is to be partly in public and partly in private hands. In Mr. Porter's opinion private enterprise can do more for the public benefit than a municipality, and he would seem to desire to limit the work of municipalities almost entirely to the supply of water and light. But the value of private enterprise depends chiefly on the openings for competition, and the moment a private body obtains a monopoly there can be no doubt that it is likely to be less efficient than a municipality, since the latter can usually be stimulated by the ratepayers. No doubt the latter are often apathetic, but, on the whole, a municipality is more sensitive to public opinion than is a private corporation, and, moreover, is never in the tight place for funds in which a private trading company may find itself. But it is also true that there may be instances in which a municipality may be going beyond the proper mark in undertaking work or in pledging the ratepayers' money. There is, for example, no doubt whatever that the Corporation of Manchester ought never to have lent money to the Ship Canal Company.

Electric Lighting at Hackney.

The extensive electric lighting works of the Hackney Borough Council, which were formally opened last week, are representative of the trend of modern electrical engineering. The pressure at which consumers are supplied for lighting purposes is the highest allowed by the Board of Trade, namely, 240 volts. The system is three-wire direct current, even although some of the feeding points at which the load is heaviest are over two miles from the central station. Consumers who desire motive power are supplied at 480 volts, which is the pressure between the two outer mains of the supply system. The benefits which accrue to consumers from this higher pressure are the cheap rates at which power is supplied, the charge being only 4d. per unit for lighting and 2d. per unit for motive power. Personally, we prefer electric lighting at 100 volts, as we consider that ordinary 100-volt lamps are much more efficient than 200-volt lamps. Again, electrical engineers are beginning to minimise the risks of shock. At a recent visit of inspection to the Portsmouth Electric Tramways Mr. Trotter, the electrical adviser to the Board of Trade, demonstrated by touching the trolley wire under a railway arch that the risks of shock were greatly exaggerated. These risks may be exaggerated, but considering the number of foolhardy people there are in the world, we think that this exaggeration does more good than harm. Demonstrations by electricians that under certain definite conditions it is safe to touch a live 500-volt or 20,000-volt wire teach nothing to experts, and only tend to mislead the public. Mr. Hammond has made the risk of serious shock at Hackney a very small one by using triple concentric mains similar to those used in Glasgow, and as the outer cylinder will naturally always be nearly at the same pressure as the earth, no pressure greater than 240 volts will be able to be got at by the public, who only use the lighting supply. A special feature of the Hackney scheme will be the utilisation of refuse for the generation of electrical energy. The refuse destructor, when finished, will consist of twelve furnace cells, capable of burning 160 tons of refuse per day. The refuse will be practically automatically

handled from the time of its arrival at the works until it is carted away as clinker. A powerful blast fan will enable it to be burned at a high temperature, and the hot products of combustion will be utilised for raising steam in three of the six water-tube boilers.

Greenhouses and Glasshouses.

AT the present day, when market gardening is becoming more and more an important business, the recent decision of Mr. Justice Cozens-Hardy in the case of Mears *v.* Callender is of considerable interest and importance. It raised, in the first place, the question whether a tenant could take away glasshouses erected by him for the purposes of his business and without the written consent of the landlord. The glass roof rested, in the case of one house, on concrete sides; in the case of the other houses wooden piles were driven into the ground, on the top of which sills were placed which supported the glass span roof. These roofs were nailed to the sills, which in their turn were nailed to the posts. "If," said the Judge, "erected for the mere purpose of pleasure and ornament and not for the purpose of a trade, they would not be removable," but he held that being erected for the purpose of trade they could be removed. It was unnecessary for the purposes of the case that the removability of ornamental conservatories should be considered, but it is, we think, doubtful if the law in this respect is as clear now as Mr. Justice Cozens-Hardy seemed to think. We can see no reason in principle why glasshouses lightly affixed to concrete or wooden foundations should not be as removable as tapestry fixed to a wall. The case in regard to these glasshouses for trade purposes up to the date of this last decision has not been altogether clear, but the Judge could hardly decide in any other way than he did, for, as he rightly said, "the whole tendency of the Courts in recent years has been to enlarge the rights of tenants in respect of fixtures," and we may add, in respect of domestic, as well as of trade, fixtures. It has, however, to be noted that tenants must still be careful in regard to this class of building, because sometimes, as in the present case, the lease may expressly exclude the action of the Agricultural Holdings Act, the thirty-fourth section of which enables the tenant to remove such things as glasshouses. Therefore, if this Act is expressly excluded, the tenant has only what is called his common law rights to rely upon, and it is only by virtue of these rights that he can remove glasshouses erected for the purposes of trade.

Church of St. Jean, Montmartre.

THE new Church of St. Jean at Montmartre, which is being built to replace the old Church of St. Pierre, adjoining the immense basilica of the Sacré Cœur, has again got into difficulties with the administration, and the Prefet de Police has given orders to the architect to stop the work of construction at once and to proceed to demolish the building, which is now nearly completed. This church has already attracted considerable attention in architectural and building circles, first on account of the novel style of architecture which M. de Baudot, the well-known Diocesan Architect, has given to his design, and again by reason of the nature of its construction, entirely in armoured brick and cement called the Cottançin system. The Prefet de Police requires the immediate demolition of the church under a penalty of 4*l.* per day of delay, simply because a proper demand for permission to construct was not made by either the architect or the vicar of the parish. The latter, considering that he had the right to build in spite of the Prefet, continued the work. It appears, however, that the Prefet is exceeding his rights, and that the vicar will win the day, for, according to the law relating to building rights, no demand for permission to construct a church on one's own property is necessary. The case is exciting great interest in Paris, for nearly 16,000*l.* of building work has already been done on the church.

The Westminster County Court, St. Martin's-lane.

THE Commissioners of Works recently addressed the Mayor and Corporation of the City of Westminster with the object of learning which of the old Vestry buildings will no longer be required, and whether any of them can be rendered available as a new County Court for Westminster. The lease of the County Courthouse in St. Martin's-lane expired not long sinc. A proposal has been formulated for transferring the County Court business to the somewhat remote Town Hall in Caxton-street, Westminster, which the municipal authorities will vacate upon the completion of the alterations of St. Martin-in-the-Fields Vestry Hall, which are now being carried out, under the directions and superintendence of Mr. John Murray, for its conversion as the Hall of the City of Westminster. The County Court in St. Martin's-lane was established about fifty years ago to replace the Court of Requests, of which the business had been conducted in premises (formerly a Baptist chapel, and since demolished) that stood at the rear of the County Court-house. A new boundary will shortly be assigned to the limits of the jurisdiction of the County Court. They have hitherto extended to the wide area having the City boundary on the east, the Thames on the south and south-east, a winding line from Chelsea Bridge to the north end of the Serpentine on the west, and the high road from Bayswater to Holborn Bars on the north. That area is fairly co-terminous with the older confines, since reduced, of the parish of St. Margaret. The Hall in Caxton-street was built on the site of St. Ermin's-hill workhouse in 1881-3, from the designs, selected in competition, of Messrs. Lee & Smith.

Charing Cross Hospital and its Site.

THIS institution, being at that time the eighth of its kind in London, was established for the two-fold purpose of a dispensary and a hospital by the exertions of Dr. B. Golding as an extension of the neighbouring charity founded in 1818. The present buildings were erected in 1831-3 after Decimus Burton's plans and designs as a part of the scheme of the Commissioners of Woods and Forests for the improvement of the western portion of the Strand, in pursuance of the Act 7 George IV., c. 77, Lord Lowther being Chief Commissioner, and W. C. Mylne acting as valuer on behalf of the Government. The principal front extends along all the western side of Agar-street, the return fronts along Chandos and King William streets continue the triangle, at the apex of which is the Ophthalmic Hospital established in 1816. In 1870 some interior alterations, including the principal staircase, were carried out by James Thompson; and about that time the Governors acquired one or two houses in Chandos-street. In 1898 the Commissioners of Woods and Forests agreed, upon certain conditions, to sell to the Governors of the hospital for 16,114*l.* the freehold sites of Nos. 23-7, King William-street, of "Toole's" (formerly the Charing Cross) Theatre, and of Nos. 15-6, Chandos-street, to provide space for a new out-patients' department, with other needed improvements of the hospital buildings. The ground was finally cleared in the course of last year, and Mr. A. Saxon Snell, whose designs secured the first place in a limited competition, was appointed architect for the alterations and additions in respect of which a tender of Messrs. Holloway Bros. for 82,730*l.* has just been accepted. The Charing Cross Theatre had been built as the Polygraphic Hall in 1847-8 on the site of the residence and chapel of the Fathers of the London Oratory of St. Philip Neri, after the designs of James Thompson, whose son, John J. Thompson, rebuilt it for Mr. Toole in 1883. The theatre, which had latterly been the domicile of the revived Beefsteak Club, was pulled down five years ago.

St. Nicholas' Parish Church, Deptford.

WE read that the fabric of the tower, from the level of the belfry floor upwards, of the church has been condemned as being in a dangerous condition. The structure suffered damage during a gale on October 17 last. The Early English tower, constructed of stone, formed in past times a conspicuous landmark for the shipping in the Thames. The church, situated between Deptford Green and the Stowage, was enlarged in 1630, and the nave, aisles, and chancel were rebuilt, of red brick, in 1697. A few years ago a fine piece of carving in oak, representing Ezekiel's Vision in the Valley of Dry Bones, and attributed to Grinling Gibbons, was removed from the charnel-house porch into the interior of the church. The organ, originally by Smith (1697), was rebuilt in 1868 by Hunter, and since repaired by Bevington. Amongst the monuments are those in memory of two of Evelyn's children, of Captain Fenton, who accompanied Frobisher on two voyages, and of several naval commanders who fought against the Dutch, French, and Spaniards at sea. The burial-ground, covering 1¼ acre, which is detached, and has an entrance in Wellington-street (formerly Flagon-row), was laid out, at a cost of 300*l.*, by the Kyrle Society, and opened to the public on July 9, 1884.

Housing of the Working Classes.

AT the annual meeting of the Workmen's National Housing Council in Clifford's Inn Hall, on November 4, Mr. Raymond Unwin delivered a lecture on "The Housing of the Working Classes." The lecture was well illustrated by lantern slides of plans of the numerous efforts of municipalities and others to meet the want, which were used by the lecturer chiefly as examples of what to avoid. He compared the existing system of laying out artisans' dwellings in streets with the plan of arranging them in quadrangles advocated by him. Mr. Unwin claims that by the latter arrangement the difficulty of aspect is got over, and living

rooms facing the back have a cheerful and healthy outlook, unlike the sunless outlook from the living rooms of many recently erected workmen's dwellings, and area within the quadrangle is more advantageously utilised as a recreation space, free from passing traffic. He urged the benefit of common rooms and common laundries at each of the four angles of the square as a satisfactory solution of modified co-operative living, which can only be successful by judicious limitation, the lack of which, to a great extent, is responsible for the failure of the Boundary-street common laundry scheme. Mr. Unwin showed several more or less successful plans of cottages on the quadrangle principle, with free backs unbroken by projections, which are always to be avoided where possible. His ideal schemes are more suitable for the country than the heart of London. The arrangement of rooms successfully meets the difficulties, but might have been more simple, and many of the sketches shown were scarcely models of good design. Some interesting slides of Port Sunlight and Mr. Cadbury's model dwellings were put on the screen. Several delegates from London municipal building committees were present and took part in the discussion.

The Bazalgette Monument.

In the monument to Sir Joseph Bazalgette, unveiled on Wednesday by the Chairman of the London County Council, Mr. Geo. Simonds, the sculptor, has followed the wise French fashion of making the monument a portrait bust in an architectural framework, instead of attempting a full-length figure in modern costume. The framework consists of pilasters and an entablature in white marble, let into one of the large and hitherto useless pylons of masonry which diversify the embankment; the bronze head being placed in the enclosed space, relieved against a deep hollow which makes a shadow behind it. The pilasters, as well as those of the podium, are carved with ornament partly symbolical; the cartouches on each side of the podium seem to want some emblem on them to give them a use and meaning. The only part of the work we do not like is the realistic outbreak of foliage beneath the bust. Realistic metal foliage is always disagreeable, and it is the more so in this case because it is out of keeping with the conventional character of the carved marble foliage. But as a whole this is far superior in general conception and æsthetic treatment to the majority of the Thames Embankment monuments.

The Fine Art Society's Gallery.

The Fine Art Society have on view a collection of cabinet pictures by Mr. Talbot Hughes, of somewhat uncertain interest. They are mostly single figures in the costume and with the interior surroundings of the eighteenth century, all well painted up to a certain point, but not possessing that special power and finish in execution which can render a mere figure and interior interesting for its own sake and as an example of fine execution; while a good many of them have no other kind of interest. Among the exceptions which have more marked character in conception and execution are "Changing Vases" (2), "The Fan Painter (9), "Spoils of the Road" (13), and "The Dreamer" (24), the latter a very pleasing study of a handsome young man in the beautiful dress costume of the period, leaning back in some rather happy imagination. "The Violinist" (27) does not know how to hold her violin, and is no virtuoso, though a pretty girl (with, however, an alarmingly thin waist). "Memory" and "Echo" (35, 37), in spite of their titles, are little more than costume studies with wax heads. "Virtue" (36), a study for a larger picture, promises something higher than most of the finished works in the collection. The usual puff preliminary, prefixed to the catalogue, is in this case carried to a pitch which is more likely to injure than to serve the subject of it.

The Decorations at Victoria.

The decorations at Victoria Station last week, put up in honour of the return of the Duke and Duchess of Cornwall, deserve a word of recognition; for though not attempting anything novel or original, they were well and tastefully done. The emphasising of the constructional girders of the roof, longitudinal and transverse, by a deep draping of a bunting in three strips of colour under each, was very effective, and showed the proper perception that temporary decoration in such a case should follow and be controlled by the lines of the construction. Outside of this portion was an arrangement of flags of various nations, drooped vertically, forming a kind of framework to the whole.

THE ROYAL INSTITUTE OF BRITISH ARCHITECTS.

The first meeting of the Royal Institute of British Architects for Session 1901-2 was held on Monday at No. 9, Conduit-street, the President, Mr. William Emerson, presiding.

Recently Deceased Members.

The minutes of the last meeting having been taken as read,

Mr. Alex. Graham, F.S.A., hon. secretary, said he regretted to announce the decease of several members since the last meeting, *i.e.*,

Mr. William Larner Sugden, of Leek, who was elected a Fellow in 1892. He was a well-known architect in that neighbourhood, and was no doubt well known to many members of the Institute.

Mr. Robert Isaac Bennett, of the firm of Royle & Bennett, of Manchester. He erected a large number of edifices, and was an architect of very high repute.

Mr. Yeoville Thomason, of Birmingham, elected a Fellow in 1862. He was the architect of the Municipal Buildings and Art Gallery of Birmingham.

Mr. Herbert R. Lloyd, of Birmingham, elected an Associate in 1887. He was architect of the Technical Schools at Redditch; he restored St. Mary's Church at Cowes, in the Isle of Wight, and was a very prominent and active member of the Architectural Association of Birmingham.

Mr. John Mackland, elected an Associate in 1881 and a Fellow in 1892.

Mr. John Littlewood, of Manchester, well known as a member of the firm of Mangnall & Littlewood, who had erected a number of public buildings in Blackpool and other places.

Mr. James Brooks, a gentleman well known to all of them, whose decease called for something more than a passing comment. Mr. Brooks was elected a Fellow in 1866, and his loss was to be deplored for many reasons. He was not only a familiar figure in that room and a constant attendant at the meetings of the Council, of which he was a member for a long number of years, but he was more than that: he was one of the few survivers of the old school of Pugin. Mr. Brooks never swerved during his long career in the principles enunciated in that school, and he remained a disciple of Pugin, who was the exponent of the great Gothic revival in this country fifty or sixty years ago. Mr. Brooks was an excellent church planner, the lines of his compositions were marked by simplicity, and there was one quality he possessed in a remarkable degree (and he mentioned it because it was a little opposed to the modern school of followers of Gothic work), *i.e.*, the quality of restraint, which was observable in most of his works. He (the speaker) therefore commended to the notice of the younger generation of architects the ecclesiastical work of James Brooks.

An Honour for the President.

Mr. Graham then announced that the President had been made an honorary member of the American Institute of Architects. The goodwill shown to them by their American brethren was, he felt sure, reciprocated by every member of the Institute, and he hoped the day was not far distant when it would be possible for the President to cross the Atlantic and attend one of the gatherings of the American Institute as the representative of the British Institute.

The announcement was warmly received, and the President briefly referred to it. He had, he said, crossed the Atlantic once, and he was not anxious to do so again. Still, he felt the honour which the American Institute had done him and the Royal Institute by electing him a member of their society, and he highly appreciated it. His feelings of sympathy with their American cousins in the dastardly assassination of President McKinley caused him to send a telegram to the American Institute sympathising with them in the loss the country had sustained, and he received a very kind reply from the President, and since then he had received notice of the appointment he had referred to. He would always have a very keen remembrance of the pleasant time he spent in America when he went over there as one of the judges in architecture at the Chicago Exhibition. It was a great pleasure to meet so many clever men—architects, sculptors, and literary men, and he would always recollect it with lively satisfaction. He thought the American school of architecture was doing excellent work; they were doing what certain members of the profession in England were urging the rising generation to do, and that was to let their imaginations have vent in solving the problems necessary for modern civilisation; but they had a certain amount of restraint in all their work, and they were always studying the best examples of Classic and Gothic architecture. A large number of them had studied at the Ecole des Beaux-Arts in Paris and had returned to America, and were bringing up a class of men thoroughly grounded in ancient work, which was the best ground for training the imagination in working out modern problems.

Bequests to the Institute.

The President then said that a gentleman whose death was announced some time ago, and whose interest in the Institute was as great as any man's since the Institute was started—he referred to Mr. Arthur Cates, who took such a great interest in the educational movement, and who was quite the main mover in starting the examinations which it was now necessary for any gentleman to pass who wished to become an Associate of the Institute—had left the Institute under his will the sum of 1,500*l.* for the benefit of the Institute. While deeply deploring Mr. Cates' death, they must all feel grateful to him for remembering them in his will.

Mr. Graham said that, in continuation of what the President had announced, he had the pleasure to state that the Library had also benefited from Mr. Cates' thoughtfulness and kindness. Under his will Mr. Cates had bequeathed to the Institute 215 volumes from his library. The books were, more or less, well-bound, and the Literature Committee had come to the conclusion that, in cases where there were duplicates already in the library, the books presented by Mr. Cates, which were in such good condition, should be placed in the reference library, and the duplicates in their own library should be put in the loan library. They were all anxious that the loan library should be extended, so as to be useful not only to allied societies, but to all members of the Institute. They were hampered in their space, but that difficulty would be overcome in time, he hoped. They were much indebted to Mrs. Cates for her kindness, and for the manner in which she had

carried out the wishes of her husband. She had added to the bequest a number of prints, and had kindly presented one of Mr. Cates' bookcases. He desired to move that the best thanks of the Institute be forwarded to Mrs. Cates for her great kindness and consideration in carrying out the wishes of her deceased husband.

Mr. R. Phené Spiers, Chairman of the Literature Committee, seconded the motion. The collection was a large and valuable one. Mr. Cates was a great collector and a great reader, and the books he had presented were of the greatest possible interest.

The Glasgow Visit.

The vote of thanks having been heartily agreed to,

Mr. John Slater said that since the last meeting many of the members of the Institute had participated in one of those provincial meetings which were started some time ago and which enabled them to hold their annual dinner with one of the allied societies. Many gentlemen had had the privilege of going to Glasgow, where they were loyally entertained; and he thought the Institute would like to pass a vote of thanks to the various societies in Glasgow who entertained them so well. The Glasgow Institute, whose President, Mr. Burnet, they had with them that night, could not have done more than they did to make the visit to Glasgow a pleasant one. They entertained the members at a most *recherché* luncheon at the Exhibition, and the members of the Glasgow Institute were most anxious to put their services at the disposal of the visitors. Then the Glasgow Corporation gave them a most charming entertainment at the Town Hall, which all of them enjoyed to the full. The University invited them to visit that building, and they had a most interesting meeting there, and saw the buildings, and were delightfully entertained by Principal Story. To the Glasgow Arts Club a special vote of thanks should be accorded, for they gave the visitors a pleasing invitation to be free of their club, and did much to provide entertainment for them, and to the President of that club, Mr. Christie, they were extremely indebted for two most enjoyable evenings. The Imperial Union Club also made the visitors free of their rooms, and the Royal Scottish Society of Painters in Water Colours gave permission to look at the pictures in their galleries. It would take too long and it would be out of place to go into details as to the buildings of Glasgow, but the members who saw the Arts Club would feel that at any rate skill and originality were two great features of Glasgow architecture. He asked the meeting to pass a very hearty vote of thanks to the bodies he had mentioned for what they did in entertaining the Institute on the occasion of the visit to Glasgow.

The Chairman said the Glasgow Corporation most regally entertained them in the Municipal Buildings and provided musical entertainment and refreshments in several rooms, and altogether treated them most hospitably.

The votes of thanks were then heartily agreed to.

The Secretary, Mr. W. J. Locke, stated that on October 24 and 25 an examination qualifying for candidature as District Surveyor in London was held, and Mr. C. O. Nelson, of Chiswick, passed. He had been granted a certificate of competency to act as District Surveyor.

It was also announced that at the Institute examination held in Montreal last June (the first held in the Colonies) Mr. Andrew Sharp was successful in satisfying the examiners, and he has become qualified for Associateship of the Institute.

President's Address.

The President then delivered the following address:—

Colleagues, Ladies, and Gentlemen,—I had occasion, in my two former addresses from this chair, to take a retrospective view in the one of the architecture of the past century, and in the second to consider what might be the state of our art during the coming century. This year I shall but glance at certain current points which seem to me either important or of interest.

First as to the increase of the numbers and influence of the Institute. Our numbers, I am happy to say, maintain a steady increase, and each year more candidates present themselves for examination than on previous occasions. We have, in fact, some 1,700 actual members of the Royal Institute of British Architects—or over 3,000 members, counting those of societies in alliance with us. There are also some 1,500 probationers, and more than 400 students, which is some proof of the value set on the Institute examinations and the trend towards improvement in education of architects. I think this speaks very well for our increasing prosperity, so far as it can be told by figures. Unfortunately, though our numbers steadily increase, death has recently made dreadful inroads on our members, for since this time last year we have lost twenty-one Fellows and five Associates. It is sad to find that amongst this number have been some of the greatest and most honoured names. The roll includes Barry, Burnet, Brydon, Brooks, Cates, and Young; and many of the number were carried off while in the prime of manhood and busy in harness—two of them just as they had achieved the honour of being appointed to design and carry out two of our greatest public buildings. Truly we must feel that in the midst of life we are in death. Their loss we all deeply deplore.

That the influence of the Institute is growing and not waning is shown by the number of instances in which it continues to be appealed to on architectural questions by public and other bodies, both in the metropolis and provinces, and the number of congresses and other meetings to which we are asked to send representatives and invited to express our views. There can be no doubt that if the Institute would only let its voice be heard on important points in respect to architectural questions as they arise, whether they be metropolitan improvements or other important schemes, we should, and ought, gradually to become the guiding spirit in such matters.

While touching on this point of metropolitan improvements and large architectural questions, I suggested last year the advisability of some more organised system of control over design. Whether it were by a Ministry of Fine Arts, as proposed by me, or by a Royal Commission, as has been suggested since both by the President of the Royal Academy and Lord Wemyss, is of little matter so long as the responsibility were fixed. The discussions and very varied opinions expressed in the *Times* and other journals on such a question by writers qualified or unqualified to judge seems proof of the evident necessity for some such organisation. In America, at Washington, the same suggestion is being urged on the Government.

It has been stated that the widening of Piccadilly was only a part of a large improvement scheme for that particular approach to the City from Kensington, in which the taking down and rebuilding of Walsingham House would afford an opportunity for a move in that direction. Whether this is so I have no knowledge; but the question I would ask is, Why deal with only one small portion of London at a time? The whole question of the rebuilding of London, enormously difficult as it may be or the huge expense it may involve, ought now, without further delay, to be considered. Definite improvements and building lines should be laid down in all important directions, and all buildings pulled down and rebuilt or altered in the future should be obliged to conform to the scheme. It would mean increased expense to the ratepayers as each portion of ground was taken by the authorities for the widening or improvement of the thoroughfares; but it would be a gradual work, and, though slowly, London would at length be rebuilt on a properly considered plan, instead of an improvement here or a widening there being effected without relation to any well-considered inclusive scheme covering the whole problem.

And I would reiterate what I said last year as to the necessity for providing subways to avoid the constant taking up of the roads. I am glad to see that five parishes have raised an indignant protest against the ever-recurring interruption to traffic by street excavations, and that the attention of the London County Council has been drawn to the matter.

Since writing the above, I see that the Highways Committee of the London County Council will submit at the next meeting of the Council a report advocating the construction of a system of shallow underground tramways in London, with subways for pipes, wires, &c., on each side of the tramway subway, and that the experiment should be initiated in the new thoroughfare in course of construction between Holborn and the Strand. This is a step on a most important matter quite in the right direction.

The consideration of the questions of the insanitary effect of large areas overcrowded by a dense population in flats, the shutting out of sun and air, arcades over footpaths, railway works in the metropolis, sites for workmen's dwellings, &c.—these are a few of the many questions entering into any scheme of improvement, as well as the embellishment of the metropolis by its public buildings, and they should be dealt with by the Ministry or Commission to which I have referred. If we do not wish future generations to hold us up to scorn and blame us for our culpable apathy, it is time that Parliament took some step in the direction indicated.

I must again this year refer to the question of competitions. A great deal has been written of late in some of the journals on the subject of Assessorships in Competitions, and evidently without knowledge of the truth of the matter or troubling to ascertain it. The suggestion has been that the blame of the dissatisfaction so constantly arising as to awards lies at the door of the President or Council of the Institute for not having exercised sufficient care in the selection of assessors. I have therefore had a list made of the competitions held since July, 1899, up to September last, with the assessors' names and the results—that is to say, as to whether there has been any expression of dissatisfaction in regard to their awards—and the following is what I find to be the case.

There have been during this period, as far as I can find out, ninety-seven competitions held in all parts of the country and metropolis. Out of this number there were seventy-three in which the authorities chose their own assessors, or, at any rate, did not apply to the Institute to name one. Out of these seventy-three the assessors' awards were set aside and dissatisfaction was expressed in twelve cases, or practically, one in every six competitions. In the remaining twenty-four the President of the Royal Institute of British Architects, or the Council in a few instances, nominated the assessors, and in not a single instance was the award of these assessors set aside, nor can I find that any expression of dissatisfaction arose at their awards. There was only one case in these twenty-four where any unpleasantness at all rose, and that was solely on the part of one person out of sixty-two competitors for the same subject, because a certain alteration had been made in the conditions by the assessor, who was appointed a week or two after those conditions had been issued by the authorities. As it apparently made no difference to sixty-one out of sixty-two competitors, it could not have been of serious importance, and there was no dissatisfaction expressed at the assessor's award.

I think this proves how ready some even of our own members are to blame either the management or the officials of the Institute when they do not even know the facts about which they are writing or talking. A little more loyalty and real honest endeavour to serve the ends for which we are all supposed to be united and working would be more to the point, and assist materially the work of the Institute for the good of our art and the profession at large. And on this I must quote and adopt some words of Mr. Peabody's in his address to the American Institute: "We can only measure the amount of good the Institute has done by its output. Many a man who cares little for it benefits because others have cared. Many a man outside our numbers is more respected in his community, and has a more certain livelihood, because the Institute has proved itself a reasonable public body. Certainly through its influence the perils and hardships of competitions have been greatly mitigated. But all these are small and selfish ends. The real value of the Institute lies in its opportunities, in its openings for useful work and mutual high endeavour. Thanks to the wisdom of its founders, I think it has been a potent means of good. Thanks to them, it has none of the features of a selfish trade union. In a trade union a man's powers and skill are handicapped for the general good; but with us a member has entered into no engagement of any kind except that he will honourably practise his profession."

This examination of the result of the enormous number of competitions in a couple of years only is enough, I should think, to deter most men in the profession from taking part in them; but if not—and we choose to have it so

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—we should bear in mind that in every competition the larger proportion of the competitors must naturally feel disappointed, as there can only be one winner ; and if a man does not care to take this risk he should not compete. As I said last year, one can only endeavour to nominate the right man as assessor ; but even he is hardly likely, however level-headed, careful, and just in his perceptions he may be, to please every one. Anyhow, if the public continue to lay the burden of competition on the profession, and we prefer to bear this burden of enforced gambling, then at least let us be fair amongst ourselves, and insist that nothing shall upset the principle we have long ago laid down—that when a duly qualified assessor has been appointed, and has selected a particular design, the author of that design shall, unless there be some very special reason to the contrary, be employed to carry out the work. Otherwise we are simply playing into the hands of an unscrupulous public, prepared to take every advantage of our time, talents, and money. Even should the assessor happen to make an award that does not commend itself to all, it will certainly be better for the profession in the long run that the award be upheld than that each dissatisfied competitor should endeavour to upset it. Our only safeguard is loyalty to uphold this principle.

Our Congress last year gave rise to a most interesting discussion on bridge design, by the courtesy of the Civil Engineers at their institution. Whether it may bear fruit in the more intimate relations of the engineer and architect on the question of monumental bridges in the metropolis and provincial towns remains to be seen. The architectural effect of bridges must be the outcome of the construction at the inception of the design, and can scarcely be added as a dressing afterwards with advantage. It can, therefore, only be satisfactorily accomplished if engineers and architects would be willing to consult with each other at the commencement of any such scheme. Unless this be done, as the aim of the engineer is necessarily and properly, from his point of view, to construct in a purely scientific manner, usually omitting all that would add unnecessary weight or cost, the more such a purely engineering scheme is developed the more hopelessly ugly it usually becomes. The only way out of the difficulty appears to be for architects to study the subject of engineering for such schemes themselves, and, when opportunity offers, put forward their own views. Certainly, progress in the beauty of monumental bridge treatment may be made, if the designer will only remember at the outset that every idea in the design should be suggested by the construction, and that any ornamentation added for mere caprice certainly defeats its own object, if that object be the mere adding of unnecessary features as ornament to an already logical construction. Such friendly discussions as these between kindred professions cannot do otherwise than help in the appreciation of architecture as appertaining to engineering, and clinching the theory that architecture and engineering should go hand in hand as helpmeets the one to the other.

In speaking last November, from this Chair, of the problems that the architecture of this century is likely to have to solve, I mentioned as one the planning of large churches to meet the needs of modern congregations, with a view to avoid the blocking of the central portions of churches in the mediæval manner of our Gothic cathedrals. I wish to-day to go a step farther on this point, though I do so with some diffidence, because any suggestion of alteration in our accustomed church or cathedral arrangements is looked on by many as almost heretical ; but what I may say is with a view possibly to induce, at some later date, a discussion on the point I am going to raise—namely, that of bringing altars forward, nearer to the congregations than is possible with the present arrangement of deep chancels and choirs. Such a discussion might be very interesting and instructive from the architectural side of church arrangement, as well as in relation to the question of congregational worship in our larger churches.

In 1884 I wrote in one of the building ournals some thoughts on church planning, the object of which was to show that the common fourteenth-century plan, with the crossing blocked by large piers and the enclosed choirs in the centre of the church, though well adapted for the mediæval and monastic times, is quite unsuited to modern worship in the nineteenth century. This view now seems generally accepted ; but further than this, the fervent spirit that has developed itself under the Church revival of late years renders it necessary that the large congregations should be able both to hear and see all parts of the services for full participation in them.

Beresford Hope, in his "Worship and Order" (written many years before his death, but still, I am assured, expressing his latest views, for he presented copies of this book to friends shortly before he died), says :

"I tell the man who wants to build a church, which shall be at once useful and beautiful, to forecast that church in his mind's eye, to forecast it at work—full of worshippers joining in the 'Te Deum,' upon their knees at the Holy Communion, of worshippers listening to the evening services. Let him guess, as he only can, by such a glance how every one can hear and every one can see. Let him notice where his light falls, and where it is darkness, and in particular let him make sure that the altar and its adjuncts stand well forward, and are not lost in the obscurity of some unlucky shadow. There is no reason, beyond the prejudice which such a novelty might excite, why at times one should not construct a circular or polygonal nave. The nave of the Temple Church is precedent enough, and the glorious decagon of St. Gereon at Cologne would hold a goodly multitude. There are no more congregational naves anywhere than the octagon at Ely and the dome of St. Paul's."

All which means that what is wanted now, and much more now than when the above words were written, is a large open space for worshippers, with the altar brought well forward, and not buried in the depths of a lengthy chancel or choir, as in the case of the fourteenth-century English cathedrals, of which type the new one at Truro is a modern representative, and, however good in its architecture, is simply an anachronism.

Tradition and conservatism are well in their way, but should not go the length of hampering modern requirements with obsolete arrangements made for the benefit of colleges of monks, and not for the people. The desirability of a good open space for congregational purposes is now by most thoughtful minds generally conceded. The point I would suggest for reflection is the possibility and propriety of a further advance in increasing the facilities of large congregations for seeing and hearing, and participation in those parts of the services conducted at the altar, by an alteration in its position, which might, while being a step in advance towards meeting modern congregational wants, possibly also be found to be, in a measure, almost a return to early usage. In a modern cathedral, say, for argument's sake, the choir must contain stalls and seats for seventy to one hundred persons, with proper space for altar communicants and steps. The length would be at least 100 or 120 ft., and though this is considerably less than the depth of many mediæval churches, it, nevertheless, removes the east end of the sanctuary so far from the nearest members of the congregation that it becomes practically impossible for them, as a body, to see or hear the services conducted at the altar.

The question I ask is, conceded the open space in the centre of a large church, why should we not consider the advisability in the future of altering the arrangement of our choirs and placing the altar at the entrance to the choir instead of at the east end, with the clergy, choir, and bishop's throne behind the altar? To see if there is any reason in such a suggestion let us look back at some points in the history of church planning.

The seats for the clergy being situated behind the altar is a far older arrangement than the position assigned to them in the mediæval and monastic times. It existed at first in some of our own early cathedrals, as you all know—at Norwich and Canterbury, for instance, I believe I am right in stating that the view of the Anglican party in the Church is that their rules, doctrines, and worship are intended to be in accordance with those of the earlier Church, and go back to the time before the Bishops of Rome established the Roman Church as the chief of all the churches, and arrogated to themselves the position of supreme head as Pope or Father. Now at this early period it is certain that the arrangements in the Christian churches provided for the altar being immediately in front of the congregation, and the seats for those who officiated at the various offices and at the altar being behind it. It is interesting to note how the earlier arrangements developed and were altered to meet the requirements of various times and peoples, and changes of thought.

Let us glance broadly at the various alterations that have occurred. In the early basilican arrangement, as in old St. Peter's at Rome and St. Paul's without the walls St. Apollinare at Ravenna, St. Clemente at Rome, both in the ancient and lower, and the later or upper churches, and later also at St. Ambrosio at Milan, Sta. Maria Maggiore at Rome ; also at Torcello and Parenzo, and in the Armenian Church of Pitzounda, in the Coptic churches, and, as before mentioned, in Canterbury and Norwich, and also at the little early church of Deerhurst, it was evidently thought desirable that no great distance should intervene between the congregation and the altar, and for this reason no doubt it was placed in front of the Bema, thus bringing it in close proximity to the worshippers. In those days the form of worship was comparatively simple, and the officiating clergy, who probably acted as cantores also, were seated behind the altar, their seats being ranged around the Bema, with the Bishop's throne in the centre, and the worshippers evidently took full part as well as the clergy in the ceremony of Divine worship.

These altars, it is true, faced the reverse way to ours, and the priest officiated standing behind the altar facing the people and the east. Now both priest and congregation in our churches usually face eastwards or towards Jerusalem, perhaps originated by Solomon's prayer at the dedication of the Temple, though other reasons are more usually given for the custom. Some few centuries later, when, in consequence of the holy mystery of the Divine Sacrifice being more prominently suggested in the church arrangements, indicated by the veiled altars, the ritual had extended and comprised more ceremonial, and more attention was paid to music, the addition of a chorus cantorum or choir was made, intervening between the altar and the congregation and jutting into the nave. The clergy still occupied the same position behind the altar during the missa and officium divinum, but subsequently those in holy orders, as well as the cantores, occupied the lower portion of the choir during the officium divinum, and those only actively engaged in the missa occupied the Bema.

One evident reason of the choir being thus brought forward into the nave between the altar and the congregation in the basilican churches, as in the upper church of San Clemente and others, seems likely to have been, that had the increased number of singers been placed, like the priests, behind the altar, it would have necessitated in such a plan the position of the altar being moved some bays down the church, towards the centre of the nave, by which arrangement many of the worshippers in the large aisles would have found themselves during the missa behind the altar and the officiating priest, instead of in front.

It seems to me there could have been no other logical reason for the departure from the first method of arrangement, which brought the altar in greater proximity to the congregation ; and from this departure by gradual steps our mediæval choirs were evolved, resulting eventually in the abbey churches in the entire shutting off of the altar, clergy, brotherhoods, and choirs from the congregations by the elaborate screens even now remaining in many churches both here and abroad.

The more exalted ritual, with its greater suggestiveness of the importance of and reverence for the holy mysteries, aided by other Roman doctrines, seems to have led to the screening off of all those engaged in the service of the church from the congregations by the veiling of the altars, as in the Coptic and Eastern churches, by the iconostasis or solid screen which separated the altar from the choir, and also a further and more open screen which again separated the choir from the congregation. Instances of both these arrangements are found—of the first in the Church of Abu Sargah and the old Coptic churches of Egypt at old Cairo, in Russia and Armenia ; and of the second in the upper church of San Clemente at Rome, and other early churches, and at Torcello ; and possibly some such similar arrangement was adopted at old Canterbury and Norwich, and the little ancient church of Deerhurst.

Again, later on in mediæval times, when civilised but pagan Rome had fallen, and education for the masses had disappeared, the Church being the only light of the dark ages, and the Bishops of Rome had added worldly pomp and power to the spiritual character of their office, and claimed for themselves the title of Pope as head or Father of the Universal

Church, it was to be expected that the clergy and monastic orders should have conceived it necessary, considering the strong line of demarcation they had drawn between themselves, their elevated office, and the ignorant laity, to emphasise this point in their churches by altogether enclosing for themselves and occupying the central and best part of the churches and cathedrals. This was the natural evolution of the first enclosed choirs in the Basilicas placed between the altar and the congregation, and completed by the separation of the clergy and monastic bodies from the laity. This arrangement is familiar to us all in the numerous cathedrals with the enclosed choir or pulpitum. By this plan the congregations were debarred from any prominent or general joining with the clergy in divine service or public worship, excepting in connexion with the mass or services held at the altar which it was then found necessary to place in the nave, outside the choir, or rood screen, as was the case at Lincoln and York. These altars were for the popular services. There was a great screen between the western piers of the central tower, the altar in the middle and doors on either side. A necessity for this altar for popular or congregational services is felt at the present time in some of our cathedrals, as at Norwich, in consequence of the enclosed choirs still remaining.

In the early mediæval times, that the congregations should unite with the clergy in public worship was, judging by the arrangements then existing, apparently considered of small moment. The people were to be impressed, or perhaps improved, from a spiritual point of view : but their worship was done for them, if I may so express it, by proxy, "as in the Jewish sacrificial rites, when the priests and Levites acted alone, but with this difference, that in this case the people could not even join in the prayers and praise, as did the Jews, for the reason that the divine offices were not in the vernacular." It was when, later on, education, both religious and secular, caused an expansion of thought and feeling in the popular mind that an alteration was felt to be necessary ; and it was the recognition on the part of the clergy for the necessity of the participation of the congregations in the whole of the services that caused the introduction of these second prominent nave altars in such proximity to the people that all could easily see and hear, and, at last, the holding of the services in the language of the people, as an additional aid to their heartily joining in them.

This principle of two altars is sometimes considered not in accordance with the feeling of the English Church, which it has been said is one church, one altar ; but it seems to have been the outcome, first, of the desire for the separation of the clergy and choir from the congregation, and, secondly, of the basilican churches having first arranged the choirs intervening between the altar and the congregation. If the basilican churches—which, after all, were first derived from courts of justice—had had, instead of the Bema, long chancels or choirs to accommodate a large number of cantores, like the late cathedrals, is it not possible that the same relative position of the altar near the congregation would have been maintained, and the chorus cantorum have been placed behind it with the clergy, instead of in front of it? The fact that later on the nave altar outside the choir were found necessary seems, to my mind, to argue that it would have been so.

In Spain in the fifteenth century the arrangement obtained of the *coro* or choir being placed in the nave and the altar in the eastern part of the church, with the congregation intervening between the altar and the choir. A modified form of this principle of arrangement is now to be seen at Westminster Abbey ; and this plan was, no doubt, also the outcome of the feeling for the necessity of the altar being not too far distant from the congregation. There are also many instances now in Italy of the choir being behind the altar ; but in some of these cases the public are brought too near the altar, which seems somewhat derogatory to reverence, as in Sta. Maria del Fiori, at Florence, where the high altar was placed under the dome, and the congregation entirely surrounds it. At Sta. Maria Maggiore the altar is still at the entrance of the Bema in the nave, and the choir and stalls for priests behind it on either side of a second altar at the end of the apse or Bema ; and a somewhat similar arrangement exists in the semi-Romanesque churches of Cologne and St. Gereon, thus bringing the altars in proximity to the congregations.

Does it not seem evident, from these variations at different times of the arrangements made to suit the feelings and education of the ages, that there can scarcely be said to be a hard-and-fast line drawn, or any grave law that would be broken if the present plan of accommodation of our tripartite arrangement of congregation, choir, and sacrarium, were somewhat altered to meet modern requirements, however much, in some respects, our sentiment and conservative feeling make us averse to alterations?

The present arrangement, when we consider the late earnest Anglican movement, which claims to go back in its faith and ritual to the period previous to the absolute sway and domination of the Roman Church, seems in some respects to be wanting and illogical, where, as in our larger churches and cathedrals, large choirs and numbers of clergy have to be accommodated, causing, by this plan, the altar to be removed from the congregation, say from 80 ft. to 150 ft., and suggests the necessity for some revision in our plan which shall, as in the early times, bring the altar and the services conducted at it in closer proximity to the worshippers.

I quite feel that difficulties arise which are not easy to surmount in the suggestion of the principal altar being placed at the entrance to the choir, but I do not see that they are insurmountable. First, there must be the elevation of the choir above the nave, and then of the sacrarium and altar above the choir ; but with a wide choir, and a large open space in front, I do not see that this would be impossible any more than at Sta. Maria Maggiore in Rome, or at the Duomo in Florence.

Also there is the question of a great reredos, but a canopied altar and a dossal of beautiful workmanship and precious and rare materials might be infinitely more satisfactory and in better taste than some of the large and elaborate altar-pieces of soft stone and inferior sculpture and workmanship that have been erected in many of our churches in late years. One objection, no doubt, that would be raised to such an arrangement would be, that by the present plan we are supposed by degrees to arrive at the holiest of all at the altar, which, therefore, is removed furthest from the vulgar ; but the Roman Church has evidently not attached weight to this, and why should ours? A second altar might be placed at the extreme east end and used for smaller services, the bishop's throne and the choir and stalls remaining in the same relative position as at present. With the enormous congregations our churches are now attracting, width of nave and choir and spacious interiors are a necessity, and with these, were it found advisable, this arrangement could, I imagine, be made to suit our worship as easily as the Roman Church has, in numbers of instances, made it suit theirs.

As to its advisability in regard to sentiment and conservatism, no doubt many adverse arguments could be raised ; but, all the same, the question would still remain of the vital necessity for fervent worshippers being able to see and hear and join in all parts of Divine worship. The subject has been in my mind for a number of years, which must be my excuse for bringing it before you on this occasion, and, after all, it is as much an architectural question as an ecclesiastical one. At any rate, I am not the first to have proposed such a thing, and numbers besides myself are interested in the subject. I would commend the point for consideration to any of you who may be likely to have the chance of erecting a large church or cathedral suited to modern times.

Gentlemen, this is the last time I shall have the honour of addressing you on the first day of a new Session, and I can only conclude by once again saying how greatly I feel the honour you have conferred on me and the confidence you have reposed in me by again electing me as your President, and I assure you I shall continue, as I have ever endeavoured to the best of my ability, to do all I can to further the interests of our noble art, to extend the influence of this Institution, and to uphold in the highest sense, as far as I am able, the dignity of our profession. To these ends the Council are ever ready to give their unqualified aid, and I only ask you all to loyally join with us in our endeavours.

Mr. J. Macvicar Anderson, in moving a hearty and cordial vote of thanks to the President for his able and interesting address, said it was pleasing to all loyal members of the Institute, as he took it they all were, to hear from the head of the Institute of its prosperity, both as to numbers and in regard to the influence which it exercised. Increased membership meant, of course, increased funds, and he referred to that in order to impress upon the Council again the advisability of allowing the surplus funds of the Institute to accumulate and not to be in a hurry to spend them. It was sad to know of the loss of well-known and valued members. In the case of Mr. Arthur Cates, no one knew better than he (the speaker) did what the Institute owed to him. Mr. Cates was not so much an architect as a surveyor, and yet he devoted his time, with indefatigable energy, to the interests of the Institute, and more particularly to the carrying out of the scheme of examinations, which had been so remarkably successful, and his memory might well be held in high regard by members of the Institute. It was sadly pathetic to think, too, that the two architects who, after much consideration, were nominated to carry out two great Government buildings had passed away, and it was pathetic, also, to know that a leading member of the profession had been laid aside for many months by serious illness. With the name of Alfred Waterhouse they had all been accustomed to associate an architect of great power and ability, and a prodigious worker of unbounded energy and activity. They could only hope that he would be spared for many years of usefulness, though it might not be of activity, and that in enforced retirement he might find that perfect rest and peace to which his active life so thoroughly entitled him. In regard to the widening of Piccadilly, the view he held was that it is too soon to enter upon such serious changes. It seemed a little unwise to begin by widening the widest part of Piccadilly so long as the narrowest part was allowed to remain narrow. There could be no doubt that in course of time underground communication in London would come more and more to the front, and he believed that, sooner or later, some such communication, similar to that on the north side of Hyde Park, would be constructed from the West End to the City. In saying that, he should add that he would oppose such communication being taken near the foundations of St. Paul's Cathedral ; that was a scheme above all others to be avoided, but it did not seem to him that that feeling militated against this underground communication. If such a communication were made, and if the result were what the result of a similar communication had been on the north side of the Park, *i.e.*, to run the omnibuses off the road, then there would be ample room in Piccadilly for all other traffic. The best course seemed to be to wait, and not to go into extensive alterations which, as some thought, would ruin Piccadilly and which might be found to be ultimately unnecessary. As to the well-worn subject of competitions, many of the expressions of the President met with his entire approval. As to the "unscrupulous public," no doubt the public had become unscrupulous in what they expected of architects in the matter of competitions ; but who was to blame for that? Not the public, but, in his opinion, the architectural profession, for no sooner was a competition announced than architects with great speed responded to the invitation to compete. He thought architects would better serve their own dignity and the welfare of the profession if they refrained from responding. He knew he was singular in that opinion, but he had never thought otherwise, and the older he grew the more he became confirmed in it. He was sure that the wisest thing for the profession to do in the matter was to have nothing to do with the burden the President had referred to, and if architects would refrain from so readily responding to invitations to compete the question of competitions would soon be solved. There was one competition which had occupied a great deal of attention lately, and that was the competition for the proposed cathedral at Liverpool. A great deal of nonsense had been written on the subject, and in his opinion the proper course for the Liverpool Committee to have followed was to have appointed the President of the Institute as the architect of the cathedral. Fifteen years since a competition was held and three eminent architects were asked to prepare designs. The late Mr. Ewan Christian was

appointed assessor (and no man had more sound judgment in such matters), and after much care he selected the design sent in by Mr. Emerson. It was true the site had been altered and the circumstances changed, but those were not sufficient reasons why the great labour and thought given to the matter by Mr. Emerson should be set aside. The President had devoted the greater part of his address to a subject which was of great importance, viz., the plan of modern churches. There could be no doubt that the mediæval plan of our modern churches and cathedrals were not suited to the worship of the present day, but at the same time the mediæval arrangement gave a wondrous charm and attraction to churches and cathedrals, and if that charm and attraction were to be lost by adopting a different arrangement, one would hesitate a long time before adopting it. It was a subject which had very properly been brought forward for the consideration of architects. As to the position of the altar, there could be no doubt what the origin of the idea was, for the Saviour dispensed the first communion on earth with his disciples all sitting at one table. Therefore, the idea of placing the altar at the most remote part of a long chancel, away altogether from the congregation, was certainly not confirmed by the primitive and original idea of communion.

Mr. G. H. Fellowes Prynne, in seconding the vote of thanks, said that when a President had to address an Institute like theirs three times, the difficulty was more than threefold. The two previous addresses were not only able, but more full of life and vigour, and were thoroughly practical, and yet elevating in their tone, and could be read with pleasure and profit. The present address was somewhat more limited in scope, although it dealt with matters equally practical. As to the losses the Institute had sustained by death, he felt that most of them must have felt the blank which the loss of many well-known men had caused. He thought it would be an excellent thing if the Council would consider the possibility of making arrangements for the exhibition in that room of works of deceased architects. It would not only keep green the memory of dear and departed friends and confreres, but would be of great value to members individually, and would help to popularise the meetings in that room. As to the subject of improvements in London, the rebuilding that the President suggested was, indeed, a large matter ; to him (the speaker) it seemed almost hopeless. No sooner were our streets widened and buildings of ugliness were pulled down, than some fresh Goliaths were erected more hideous by their size or self-assertiveness than the former buildings. It seemed difficult to suggest any plan which would be satisfactory for the improvement of London. At the same time, as to the proposed Ministry of Fine Art, similar power had been granted in other countries, and certainly the improvement in art in the streets of those countries had been very great indeed, and a similar body, if truly representative of the art of the nation, might be of immense service both to the nation and the profession to which they belonged. As to competitions, he thought the Institute ought to be grateful to the President for having gone so fully into the matter as regards the assessors the Institute had named. He thought that would show members outside that the Council were thoroughly interested in getting absolutely fair play in competitions. He could not help referring to the great competition for the Liverpool Cathedral. He thought the President had a right to complain that he had been unjustly and unfairly treated, for the fine plan he sent in in the last competition was assessed as the best plan, and consequently the President ought to have been appointed on the present occasion. The lapse of time and the alteration of site seemed to him to make no difference, and the President ought to have been asked, at least, to send in a fresh scheme, even if the Committee would not bind themselves to accept it. Such an appointment would in no way have been regarded with jealousy or disapproval by architects generally, and it would have been welcomed by members as a compliment to the President and the Institute. In reference to the longest and possibly the most important part of the President's address, he should like to have gone into the subject in detail if it had been a paper on church planning.

The President, interrupting, said it was his idea that the matter would lead to discussion on a future occasion.

Mr. Prynne, continuing, said that the subject was of great interest, and all who planned churches must feel that there was enormous scope for much improvement in planning ; at the same time, everyone would recognise the great difficulties which existed in making radical changes in what were accepted as the principles of church planning, and although he most thoroughly endorsed the hope that our church plans might be in a sense more logical and, perhaps, more common-sense, he felt that the matter was full of controversy and side issues. Properly to build a church, the object must be something far higher, better, and nobler than that of merely seeing and hearing. We did not want our churches to become mere preaching houses or music-halls ; something higher in their design was wanted. They must design in a devotional sense in their church architecture, so that every stone and the proportions would preach better sermons than the spoken discourse. The all-seeing and all-hearing idea should not be the main idea in church planning, though, of course, it should be incorporated in church planning.

Mr. Anderson then put the vote of thanks to the meeting, and it was heartily agreed to.

The President, in reply, said, as to Liverpool Cathedral, he was grateful to them for their expressions, but he thought that some of the remarks which had been made were too strong. The present committee who had the subject of the cathedral under consideration were not all the same gentlemen who formed the last committee, and no doubt some of them thought that architecture made great advances in the course of fourteen or fifteen years, and that by having a fresh competition they would get a better design. He would be delighted if, by dropping any claim he had, they got the finest cathedral. He had been disappointed in the matter, but long ago he felt that the cathedral was almost *in nubibus*, and he had not expected it to come up again in his lifetime.

The meeting then terminated.

The next meeting will be held on the 18th inst., when Mr. R. Anning Bell will read a paper on "Mosaics."

THE ARCHITECTURAL ASSOCIATION

An ordinary fortnightly meeting of this Association was held on Friday evening last week in the Meeting-room of the Royal Institute of British Architects, No. 9, Conduit-street, W., Mr. W. H. Seth-Smith, President, in the chair.

The minutes of the last meeting having been read and confirmed, the following gentlemen were elected members of the Association :—Messrs. A. C. M. Edwards, E. F. Knight, W. H. Hillyer, H. Bailey, J. H. Gott, A. G. Parker, H. L. Samson, B. B. Hooper, W. J. Parker, J. H. Belfrage, C. J. Calder, J. C. Corblet, J. H. Crabtree, J. J. Crowe, L. H. Harrington, A. J. Healey, D. S. Jennings, H. A. P. Pierce, L. Roberts, S. H. Stock, F. A. Stowell, T. J. Tatham, T. Thorne, G. F. Webb, A. B. Botterill, W. B. Sinclair, E. Chaplin, R. B. Curwen, M. E. D. Dixon, J. V. Gibberd, Norman Hall, C. R. G. Harrison, C. McJerrow, H. Kemp, C. U. Kilner, D. M. O'Connor, A. E. S. Payne, P. Phipps, G. A. Potts, F. G. Russell, S. M. Spoor, E. G. Stevenson, R. W. Stuttle, W. J. Tomlinson, W. I. Travers, C. F. Ward, R. H. Willson, and B. H. Sutton.

Mr. R. S. Balfour, Hon. Secretary, proposed a vote of thanks to the Rotary Photographic Co. for the gift of some excellent photographs of ancient Rome. The motion having been agreed to,

The Chairman said that, owing to Mr. A. T. Bolton's appointment as Headmaster to the Day School, a vacancy had been caused on the General Committee of the Association, and in accordance with By-law 35 he gave notice that at the next ordinary meeting of the Association the Committee would nominate Mr. W. C. Waymouth, who, of the unsuccessful candidates, received the highest number of votes at the last election.

Cambridge in Early and Mediæval Times.

Mr. A. Wood, M.A., F.S.A., then read the following paper on "Cambridge in Early and Mediæval Times:"—

Some three miles from Cambridge the Gogmagog Hills rise above the surrounding country. The name is supposed to be a corruption of Hog-Magog, from Hoog-Macht, or high strength. From them a good view may be obtained over the plateau upon which stands Cambridge. At this spot we are amid the defences which the East Anglians raised or utilised against their encroaching neighbour Mercia. Across the Cam there is some elevated ground, and one catches a glimpse of the majestic minster of Ely. The hill to the north is the Castle Hill at Cambridge. Elsewhere one looks over land nearly as level as the sea which borders it to the east. We are here in the territory of the Iceni, which comprised what were afterwards Norfolk, Suffolk, and Cambridge. Middlesex and Essex belonged to the Trinobantes. Part of Cambridgeshire may be said to have hung on to Norfolk and Suffolk, and was defended on the west by the great Whittlesea Mere. The ground on which we are standing would have become a debatable land if it had not been strongly fortified on what may be called a trench-and-block-house system, the indications of which may be traced at the present day. The Great Dyke known as the Recken Dyke, the Devil's Dyke, St. Edmund's Dyke, extended over Newmarket Heath from Reche upon the Cam towards the woods of Essex. Water was the protection at one end, wood at the other. Parallel with the Great Dyke, at a distance of seven miles, was the Fleam Dyke. This began at Fen Ditton on the Cam below Barnwell, which is suburban to Cambridge, and ended at Balsham, to the south-east of the Gogmagog Hills. According to Dr. Mason, another dyke, starting about a mile south of Bourne Bridge, between Abington and Pampisford, trends towards Cambridge. This was probably for the protection of Worsted-street, a Saxon line of road which runs close beside the Gogmagog Hills.

Dyke means both ditch and mound. Scotchmen and North-country Englishmen still call a wall of whatever material a dyke. According to Palgrave, the name Rech or Recken Dyke does not come from the village of Reche, but means the Giant's Dyke, from a root found in Eastern and Western languages alike—as in the Latin *rex* and the Indian *rajah*, in the Anglo-Saxon *rican* and the common English *rich*, in the Castilian *ricos* and the Scottish *king-ric* for kingdom, and, it may be added, in the English bishopric. Still the village of Reche may have had the very same derivation. It is a poor, out-of-the-way place now, but tradition says that it was once a great city divided into four quarters, one of them inhabited by Jews.

Exning was the capital of Anna, King of the East Angles, with whom dwelt, until their departure into Kent, his daughters Ethelburga and Sexburga, and, until her marriage with her first husband Tonbert, Etheldreda, foundress of the Abbey of Ely.

Tonbert, one of the nobles at the Court of Anna, was an alderman, or, according to some, a prince of the Southern Girvii, one of the two peoples—the other being the Northern Girvii —that formed districts of the East Anglian kingdom. The Southern Girvii occupied the whole Isle of Ely.

On the summit of the Gogmagog Hills is a triple circular entrenchment enclosing about thirteen and a half acres, known as Vandlebury, which is, according to Gough, one of a chain of forts. The first is at Audley Inn in Essex, the second at Littlebury in the same county, the third at Chesterford to the south of Cambridgeshire, the fourth is Vandlebury, the fifth Granchester, the sixth Arbury, from which *castrum* or camp Chesterton, near Cambridge, derives its name ; the seventh Belsars Hill, near Willingham, ten miles to the north-west of Cambridge. All are in sight of one another, and they reach from the woodland of Essex to the Fens, their line being crossed by several parallel ditches, both forming what I have called a trench-and-blockhouse system. The camps themselves were British or Roman, but they availed to defend the kingdom of the Uffingas or descendants of Uffa, the kings of East Anglia.

But it is time to leave the Gogmagog Hills, which Henry of Huntingdon calls "the pleasant hills of Balsham," and follow the Roman road, a portion of which is the Worsted-street of which I have spoken, to Cambridge. It may be well, however, to state here that the next fort to Vandlebury mentioned by Gough, that of Granchester, is a well-marked Roman encampment. Here there was evidently an extensive cemetery, as many ancient coffins are still to be seen built into the walls of the church and churchyard. Granchester appears to have been deserted at an early date in favour of Cambridge, with which it has often been confounded. We cannot doubt that it, and not

Cambridge, was the place to which Sexburga, sister of St. Etheldreda, foundress of Ely, sent for a coffin to enclose the remains of her sister. "The brethren whom she sent," says Bede, "took ship and came to a certain ruined town at no great distance [from Ely], which in the Engiish tongue is called Grantacæstir; there presently they found hard by the walls a white marble coffin, exquisitely wrought, with a lid of the same material." It seems safe to assume that this indicates the Roman cemetery at Granchester.

In the declaration of the laws of the Guild of St. Mary, Cambridge, written in Anglo-Saxon, and to which a very early date is attributed, Cambridge is written Granta-brycge, and not Granta-byrig, otherwise one might have thought that it really meant the town upon, as Granchester is the camp upon, the Granta. The mediæval name is therefore the Bridge upon the Granta.

Granta and Cam are quite dissimilar. Cam, which is familiar to us in the word *camber*, is found in Camboritum, the Roman name for Cambridge. Camboritum is explained as the ford at the bend, the sharp curve which the river makes below the Castle Hill at Cambridge. Camboritum was, however, properly the Castle of Cambridge, not the existing, although ancient, town. Rhedum (ford), the other constituent with Cam of the name, is found in Rhedycina, the Latin name for Oxford. Ox represents such names for water as Esk, Usk, and Ouse, the last of which has been Latinised into Isis. It was only gradually and at a very late date that Cambridge supplanted the mediæval Grantabridge.

The outline of the Roman Camboritum can be readily and clearly traced. The western wall went from what is known as Mount Pleasant, and, enclosing the little Church of St. Peter and its churchyard, ran to a point near the old Norman Grange, known as the School of Pythagoras, where the southern side began, and crossed Magdalene-street by the south side of the Chesterton-road, the terrace in Magdalene College grounds forming part of the rampart. The eastern wall began a little beyond the college grounds and proceeded to Akeman-street, the Roman road, in the vicinity of the present Victoria-road.

The two roads that intersect at Camboritum are the Via Devana, running from Deva (Chester), from which it derives its name, to Camolaunum (Colchester). We have seen it as Worsted-street at the Gogmagog Hills. At Camboritum it is Magdalene-street; at Cambridge it has been Hills'-road, Regent-street, St. Andrew's-street, Sidney-street, finally Bridge-street. All this confusion might be saved by calling it from its terminus—Castle-street, the name actually given it beyond Magdalene-street.

Akeman-street is the Saxon name for the Roman road which ran from Brancaster, in Norfolk, by Cirencester, to Akemancester, the Saxon name for Bath. It seems that it must have coincided in part of its course with the Ikneild-street, which ran, also from Norfolk, by Camboritum to Old Sarum, Exeter, and the extremity of Cornwall. It would also seem that the Via Devana ran at some point into the Watling-street, which ran from London to Chester. There was another Roman road that ran towards Ely, and yet another ran near Granchester towards Bedford.

At the extremity of the natural promontory enclosed by, though not as extensive as, the Roman camp stands the mote or mound specifically known as the Castle Hill, which gives the popular name of Castle End to this outlying north-western part of Cambridge. It is also known as the Burg or Borough. It is partly natural, partly artificial. It appears to have been formerly considerably larger than now. East Anglia contains fine examples of these moated mounds. There are examples at Mileham and Buckenham; the finest example is Castle Acre in Norfolk.

The Danes were at Cambridge in 874, and the mound is probably a Saxon work undertaken at that date as a means of defence against those invaders. In the representation of the taking of the Castle of Dinan in the Bayeux tapestry the conical mound is surmounted by a timber construction which two men are endeavouring to set on fire with torches, whilst others are climbing up by a steep bridge which crosses the moat and ascends towards a gateway. Many mounds or motes of this description kept their wooden walls down to the twelfth and thirteenth centuries.

William the Conqueror erected a castle at Reche and another at Wisbeach. In 1069 he took up his residence in the Castle of Cambridge, whence he conducted his military operations against the Isle of Ely, where Hereward, the so-called last of the Saxons, maintained the struggle against him. William cleared away twenty-seven houses in constructing his castle at Cambridge, the previous one having been probably burnt along with the town by the Danes in 870 and 1010. The removal of houses was no doubt due to the construction of the base-court within the old Roman encampment, and not crossing the Via Devana. I need not pursue the not very eventful history of the Castle of Cambridge. The last remaining relic of the castle, the gateway, was pulled down almost in our own day to build the County Courts.

No less than three churches stood within the *enceinte* of the old Roman camp: All Saints', by the Castle, subsequently removed and the parish united to St. Giles'; St. Giles' itself; and St. Peter's. All Saints' was the only church within the castle enclosure. This was the arrangement at Porchester in Hampshire, Oxford Castle, and elsewhere.

In the essay on "Fairy Superstitions," in the "Minstrelsy of the Scottish Border," Sir Walter Scott relates from Gervase of Tilbury a legend connecting the camp at Vandlebury on the Gogmagog Hills with the Castle of Cambridge. This legend is said to be as old as the twelfth century, and is a specimen of the tales that circulated around the winter hearth of a castle at that period. It has further a topical interest as showing that, whilst the castle at Cambridge was occupied, Vandlebury was deserted.

In the neighbourhood of the Castle of Cambridge was, as we have seen, the so-called School of Pythagoras. This never was a school, and had nothing to do with Pythagoras. It appears to have been a farmhouse or grange of the twelfth or early part of the thirteenth century. The manor-houses of this period were usually in the form of a parallelogram, and of two stories in height. The lower story appears to have been invariably vaulted. There was no internal access from the lower to the upper story, the communication being by an external flight of steps such as we see at the King's School at Canterbury. In the upper story was at times the only fireplace in the building. Wealthy Jews appear to have been the first builders of stone houses in this country, as is seen in the Jews' house or houses at Lincoln and Moysey's Hall at Bury St. Edmunds. To the rooms above mentioned were frequently added a cellar on the lower and the solar on the upper floor. The kitchen appears to have been in a courtyard external to the mansion. The lower room of the "School of Pythagoras" is 60 ft. in length. The vault has disappeared, and there only remain two vaulting shafts. Light is admitted by an inserted fourteenth-century window of two lights. The windows on the first floor are fair examples of Transition work. This building was purchased by Walter de Merton, Bishop of Rochester, and bestowed by him upon his college in Oxford about 1270; hence the name occasionally given it of Merton Hall. It would almost seem as if he had at one time contemplated a collegiate foundation in Cambridge as well as in Oxford. It is a singular fact that Hugh de Balsham, Bishop of Ely, founder of Peterhouse in Cambridge, bestowed the advowson of the living of Gamlingay in Cambridgeshire upon Merton College, Oxford. It may be supposed that he did not at that time contemplate his own foundation of Peterhouse in Cambridge. The Oxford college thus derived a double benefit from what seems to have been a conflict of cross-purposes.

I have shown that there was a Roman road from Camboritum to Granchester. From Red Cross on the Via Devana a road ran westward, cutting the present Trumpington-road near Trumpington, and ran across the river, in which was a ford, to Granchester. There appears to have been a gradual concentration of population from the remoter parts of the area defined by the ancient road above mentioned towards the ford at the foot of the Castle Hill. This was the direction of traffic and commerce, and population followed it. This ford and the bridge that succeeded it must always have been of great importance as the only point at which goods and cattle could pass the river on their way from the eastern counties. It has been conjectured that the ancient Church of St. Benedict, remarkable for its Anglo-Saxon steeple, included throughout the mediæval period in Cambridge itself and well within its boundaries, was originally the parish church of a distinct village, overtaken by the growing town.

It has been said that Cambridge was, commercially speaking, never a very flourishing place. This appears to me over-hastily said. At Oxford the colleges have fairly strangled the town, or rather city, which in the early history was a commercial capital, and which one finds mentioned with London and Bristol. Cambridge has lost its commercial, but has retained its agricultural, consequence.

In the history and constitution of its Guilds we may read the record of its early unfulfilled promise. Guilds are of very early origin, and the English are the earliest. The Guilds were lay bodies, and existed for lay purposes. In the case of the three Guilds in Cambridge given in the return (12 of Richard II.) one altogether excludes the clergy, another prescribes that they are to have no part in its management, whilst the third has a chaplain, but with the condition that if the funds run too low to maintain both a chaplain and the poor brethren, the chaplain shall be stopped.

Two Guilds—those of Corpus Christi and the Blessed Virgin—combined to found Corpus Christi College. The Guilds themselves united and bestowed much of their property in houses upon the college. This excited the people of Cambridge, who, in 1381, instigated by the Mayor and led by a certain James of Granchester, a local Wat Tyler, plundered and destroyed the house of a University official, the Esquire Bedell, whence they hurried to Corpus Christi, broke open the college gates, assaulted the master and fellows, and seized upon the college charters and plate. They next went to the house of the Chancellor of the University, whom they constrained to subscribe two bonds, subjecting the University to the town, and engaging the University not to prosecute the town on account of these violent proceedings. The mob, after burning the University charters in the market-place, assailed Barnwell Priory and the Nunnery of St. Rhadegund, both of which had large possessions in the town, and the riot was only put down by the arrival of the Bishop of Norwich with an armed force. Dr. Keys relates in his history that after the burning of the University charters an old woman, Margaret Sterr, threw ashes—I suppose those of the charters—into the air, and shouted, "Thus let the learning of all scholars be confounded!" This amiable lady appears to have possessed an exuberance of civic life, and there is this to be said for her, that throughout the whole Middle Ages the colleges were thrusting themselves into and absorbing the most important region of the town, that adjoining the river, and were unpopular in consequence.

There were till lately several old houses in Cambridge, particularly in Bridge, Trinity-street, formerly the High-street, and the neighbourhood of the Petty Curry. The Jewry was in the parish of St. Sepulchre, and occupied a large part of All Saints' parish, including the site of St. John's College. The Synagogue and the house of Benjamin the Jew (afterwards converted into the Tolbooth) were not in the Jewry, but in the market-place, near the present Guildhall. Some have thought that the Jews did not live in the Jewry, but that is a mistake. As a matter of fact, they constructed numerous stone houses in and about the Jewry at a time when the majority of houses were constructed of wood. The presence of Jews in a town in such numbers as to have a special quarter assigned them is an evidence of its commercial importance.

I have referred to the Cambridge Guilds at an early date. At that time their ordinances were full and original. It is probably an evidence of the commercial decline of Cambridge that a very singular change took place in the fifteenth century. Nowhere else in England did, as in Cambridge, one Guild after another simply copy out the ordinances of an older Guild. Ordinances professing to be those of distinct Guilds, with more than forty years between them in the dates of their foundation, "are more identical in shape and words, so far as these could be used by separate bodies, than are the different versions of what are avowedly copies of the same by-laws."

The Cambridge charters have been published in the course of the present year under the editorship of Mr. F. W. Maitland and Miss Mary Bateson.

The churches of Cambridge would take a volume in themselves. To make the study of

them intelligent one has to make a circuit of several miles round Cambridge, and even further than that at individual points, to trace their similarity to other churches in the same district. Thus what I have seen described as the singular tracery and form of the windows at St. Michael's, Cambridge, proves not to be singular when compared with that at Over, some miles to the north-west of Cambridge, which appears to be by the same architect or band of workmen.

I shall omit all notice of the most remarkable church in Cambridge, St. Sepulchre's in the Jewry, as that is well known, and has been fully described as one of the round churches of England. I shall speak of those only which were connected with the colleges, and in doing so I shall take them in chronological order, as they existed in, and were part of, the town before the colleges were built.

The oldest church in Cambridge and the oldest building in the town is St. Benedict's, or St. Bennet's, Church. Its situation is slightly to the west of the site of the Austin Friars, and immediately adjacent to Corpus Christi College. The body of the church was restored by Mr. R. Brandon, and exhibits few traces of its remote antiquity. The tower, however, remains intact. It is of that version of Early Romanesque which we commonly call Saxon. It is in diminishing stages, not in one upright mass, as the tower of St. Michael's, Oxford. The material is rough masonry, the quoins being in "long-and-short" work. Of the three stages of which the tower is composed the lowest occupies nearly half of the entire height. The divisions are made by plain projecting string-courses. In the midst of each face of the belfry stage is a window divided by a central baluster standing in the midst of the thickness of the wall and supporting an abacus extending completely through the wall and bearing two semi-circular window-heads consisting of a single stone. There are smaller windows in each face set laterally to the larger ones, but on a higher level. The baluster shafts of the central windows are ornamented with a band of rudely-carved rings. The crowning member is a plain coping.

The tower of St. Bennet's communicates with the nave by a massive semi-circular arch having capitals adorned with roughly-carved representations of animals. Of the church contemporary with the tower only a few fragments remain built into the existing walls. The nave is of the thirteenth century. The original approach for the parishioners was by a porch, no longer existing, at the west end of the south aisle. The south aisle of the chancel is formed by a building that in mediæval times consisted of an upper and lower chapel, the former of which was used as a lecture-room. In the north wall was a window commanding a view of the parochial chancel. This building, deprived of many interesting features, is still connected with Corpus Christi College by a gallery supported by a four-centred archway.

The advowson of St. Bennet's was purchased by the founders of Corpus in 1350, and the Royal licence for the appropriation was obtained in 1352, but was not acted upon until a very late date. The college was in the parishes of St. Bennet and St. Botolph, one standing at one and the other at the other extremity of the site. The statutes of the college bound its members to attend service daily in one or other of the churches. A trace of the former connexion with the college is the monument in St. Bennet's of Richard de Billingford, Master of Corpus in 1398, who died in 1432.

Much the finest example of First Pointed in Cambridge is what is now, and has been since the early part of the sixteenth century, the Chapel of Jesus College, formerly that of the Nunnery of St. Rhadegund. It was erected between the years 1150 and 1245, the north transept being the oldest portion of the existing building. It was originally in the form of a cross, with a tower in the centre, and had, in addition to the transepts, aisles on the north and south sides of the eastern limb, flanking it along half the extent of its walls and forming chapels, which opened into the chancel by two pier arches in each wall. Of peculiar beauty are the piscina and sedilia; the series of lancet windows, with blind arcading between them, in the chancel; and the roof-story gallery on the inner side of the tower walls. The piscina was thought so beautiful that it was copied in the parish church of Histon, to the north of Cambridge, and in the ancient Hospital of St. John, where St. John's College now stands. The nave had seven piers on either side between it and the aisles. These piers were alternately cylindrical and octagonal. Upon this splendid fabric Bishop Alcock of Ely brought what was little else than ruin in transforming it into a college chapel. A considerable amount of his work has been undone in our own day, and there appears to be no reason beyond the expense that would be incurred to prevent the whole being brought back to its primitive condition.

The Cambridge example of the Second Pointed style is the fine Church of St. Mary-the-Less without Trumpington Gates, attributed to Alan of Walsingham, remarkable for its window tracery, and particularly for that of its east window, in which some see an approach to the Flamboyant character. The first church on this site was in the Norman style, and was known as St. Peter's without Trumpington Gates to distinguish it from St. Peter's by the Castle. The college was named St. Peter's from this church.

This church fell down about 1350. The actual Church of St. Mary was built as Merton Chapel or Church in Oxford to serve both for the college and the parish. It is a lofty body without aisles or any structural division between nave and chancel. The separation was effected by a screen. The length is 100 ft. and the width 27 ft. The church is divided into six bays, each of which, except the westernmost, is a double square in plan. It is lighted by lofty windows having between them deep buttresses. The tracery of the windows on the north side is all modern, with the exception of that in the easternmost window. In the eastern gable and in that on the south side are windows the tracery of which is exceptionally rich and flowing. The tracery is in the same style, and even from the same patterns, as that of the same date in Ely Cathedral. In the fourth bay are traces of chantries both on north and south, opening from the chapel by doorways and arches with rich complex foliation which formerly overhung monuments placed upon the line of the foundation of the wall. At the east end of the church is a vestry in two stories erected against the south wall of the easternmost bay, whilst against the next bay is an apartment or vestibule, entered from the south side of the choir. An ancient stone staircase leads from this vestibule to the gallery communicating with the college, so that the members of the community could use this as a private entrance. The floor of the vestry is raised upon a vault, which was used as an ossuary or charnel-house. The gallery connecting with the church is of the middle of the fifteenth century, at which date the choir was refitted. The new quadrangle of Peterhouse was built at the same time.

At St. Edward's Church the aisles to the north and south of the chancel belonged, that on the north to Trinity Hall, and that on the south to Clare College.

The south aisle of St. Michael's Church served anciently as the chapel of Michael House, one of the collegiate establishments on the site of Trinity College. The north aisle was the chapel of Gonville Hall. In this church was buried Hervey de Stanton, minister of Edward III. in 1337 and founder of Michael House.

St. Mary-the-Great is the University church. It has a lofty nave, with span aisles, and lighted by twenty windows in the clearstory.

One might be tempted to think on entering a college that the chapel was the most important building, the first built, and that all the other buildings had clustered round it. That is not the historical fact. The least ambitious part, the chambers, comes first. Originally chambers were lodgings in private houses, such as the accommodation—if such it can be called—for students in London or in the Scottish university towns. Next, larger or smaller bodies of students came to be entertained by a *host*, who furnished a common table, to the cost of which, however, each student contributed his own expenses. So we have *hostels* or inns. Some *hostels* were of sufficient importance to have parts of the parish churches appropriated to them. Then colleges came to build their own chapels, of which arrangement Pembroke is the earliest example in Cambridge. The chamber, the hall, the chapel—such was the progressive development. Eventually, with the exception of St. Mary's, the parish church ceased to enter into University life.

So also have monastic establishments. During the Middle Ages there were many monastic houses in Cambridge. The monks of Ely had one hostel, those of Croyland another, those of Norwich a third. Of the Friars, the Franciscans established themselves at Cambridge as early as 1224; in 1249 the Carmelites moved in from Chesterton to Newnham; in 1257 the Friars of the Order of Bethlehem settled in Trumpington-street; and in 1258 the Friars of Penitence settled in the parish of St. Mary-the-Great, whence they afterwards removed to the parish of St. Peter, where their buildings were eventually absorbed by Peterhouse. There were added to these at a rather later date (1273) the Friars of St. Mary, and two years afterwards the Dominicans. The Austin Canons had been for two centuries and a half established at Barnwell Priory, and the brethren of St. John's Hospital—also under the rule of St. Augustine—were established in 1135 by Henry Frost, a burgess of Cambridge.

Two Cambridge colleges, which fall without the mediæval period, Sidney-Sussex and Emmanuel, are built, the former on the site of the Franciscan or Grey Friars' house, Emmanuel on that of the Dominicans or Black Friars. The Carmelite house was situated between King's and Queen's Colleges; the Austin Friars near the site of the new museums; the White Friars of the Order of Bethlehem on the site of Addenbroke's Hospital.

The alleged history of the town and University of Cambridge in their early days is an impossible fable, and the account attributed to Peter of Blois, Archdeacon of Bath, is not history. Universities grew up from the episcopal and monastic schools. Something was wanted of wider range than their comparatively contraeted teaching, and what became universities sprang up by the efforts of capable and enterprising teachers at suitable spots. Separate schools or colleges came in time to supplement the universities and to impart a more familiar and methodised instruction. This process was followed everywhere in Western Europe, except, indeed, in Scotland, where the students do not reside in colleges.

The word university is simply a mediæval law term for a corporation. When academical corporations were founded at Paris and Bologna they gradually absorbed into themselves the use of the word university, which had hitherto been common. The School of Bologna was called the University of Scholars, that of Paris the University of Masters, because in the one the students enrolled themselves into a corporation, and in the other the masters obtained for themselves corporate rights.

A college means properly a number of persons incorporated as colleagues for certain common purposes; the building is the house (*domus*), and hall (*aula*), and hostel (*hospitium*). The only buildings required by a university as such were a place to hold meetings and ceremonies, a library, lecture and examination rooms.

We know the appearance of the Cambridge schools in the middle of the fifteenth century. On the north side of the Quadrangle stood the Theology School, and on the west that of Canon Law, with the new library above it. To these on the south side were added the Schools of Philosophy and Civil Law. The whole building appears to have been completed in 1470 or 1471. The south building was entered by a *vice* or turret staircase at the north-east corner, known as the schools' tower and as the schools' belfry from containing the schools' bell. It formed part of the east range containing the gateway—still preserved at Madingley near Cambridge—which was begun in 1470. The east building occupied the space between the staircase and the Theology School. The entrance gateway had above its archway shields bearing the arms of England supported by lions, and those of Archbishop Rotherham of York. On the side towards the Quadrangle were seen the arms of Edward IV. and of Richard III.

These schools were the outfit of the mediæval University of Cambridge. They were confined to a single building. The colleges, on the other hand, were numerous. Still, they had a common character, so that we say now of a building that it is or looks like a college.

It has been argued that the dispositions of a monastery were derived from those of a Roman villa, and in particular from those that partook both of the character of the town and country house, and this resemblance has been worked out in detail. The cloister, with its

pillars surrounding an open court having apartments opening from it, is, it has been argued, clearly derived from the peristyle common to the Roman town house and the country mansion, which was the part of the house reserved for private use. The outer court, with its stables, granaries, &c., corresponds with the *villa rustica* of the Roman country house. The *tablinum* becomes the chapter-house. The kitchen and refectory are in both cases situated on the outer side of the court. It is easy to press the analogy too far, but there is an evident truth in it.

So it may be said that there is between the general plan and disposition of a college an analogy with that of a monastery. The general enclosure within walls, the disposition into courts surrounded with buildings, the cloister, the refectory with its attendant kitchen and offices, the chapel (where it existed), the master's lodge corresponding to the dwelling of the abbot or prior, were similar to parts of the monastic structures or those occupied by the secular canons. The common dormitory, however, was a feature not reproduced, as the members of colleges slept in rooms or chambers, and were chamberers or chums. In Cambridge the chapel, the library, the master's lodge, and the great gateways of the later were wholly wanting in the earlier colleges. Even the disposition in a square or quadrangle was not at first attempted. The founder would purchase land and houses and accommodate them to the use of his college.

The colleges which fall within the mediæval period are fourteen in number.

1. St. Peter's, the earliest of the Cambridge colleges, was founded by Hugh de Balsham, Bishop of Ely, in 1284. He transferred to certain hostels on this site scholars whom he had previously placed in St. John's Hospital. He bequeathed funds which enabled his scholars to purchase land to the south of St. Peter's Church (now Little St. Mary's) and built upon it a handsome hall. The quadrangle was not begun until 1424. The buildings were then carried on continuously until about 1466. The north, west, and south sides were successively undertaken. The east side was still occupied by the original hostels.

2. Clare College was founded in 1326 by Dr. Richard Badew, Chancellor of the University, and was originally known as "University Hall." The college was founded anew by Elizabeth de Burgo, third sister and co-heiress of Gilbert de Clare, Earl of Gloucester and Hereford. This college does not appear to have been arranged upon the quadrangular plan until subsequently to the mediæval period. It is now wholly Renaissance, and the best specimen of that style in Cambridge.

3. Pembroke College is one of the four colleges founded in the middle of the reign of Edward III. It was founded by Mary de St. Pol, second wife of Aymer de Valence, Earl of Pembroke. The Earl died suddenly in France in 1324, when his widow became foundress of Denny Abbey, between Cambridge and Ely, and in Cambridge of a house of scholars with the name of the College or Hall of Valence-Mary, by way of jointly commemorating her husband and herself. The south side of the quadrangle was begun in the lifetime of the foundress, and the construction of the chapel—the first college chapel in Cambridge—was authorised by a Papal bull in 1355. The Countess had originally chosen another site for her college, and St. Botolph's Church was to have served as chapel. The very diminutive court at Pembroke is, with the exception of the building on the south side, of later date than 1351, when the site for it was obtained. Henry VI., in his charter, calls this "the most noble, renowned, and precious college, which, among all others in the University, was ever wonderfully resplendent."

4. Gonville Hall was originally erected on another site, and transferred to the present by William Bateman, Bishop of Norwich. The chapel, occupying part of the south side, was built in 1393; the chambers that complete that side and form the west side in 1441; the east side was not built until 1490. The chapel was built with its east end free, no buildings abutting upon it.

5. Trinity Hall has the peculiarity of an entrance court interposed between the quadrangle and the street, like the *curia* of a monastery. The quadrangle is larger than in any previous college—115 ft. long and 80 ft. wide. The founder, Bishop Bateman, is believed to have built the hall and the range next the street. The rest of the west range and the north range were added in 1374. The chapel is believed to have been built in the fifteenth century. Trinity Hall was a house of study for the Monastery of Ely prior to its conversion into a college for the study of civil law.

6. Corpus Christi College, built between 1352 and 1377, exhibits the first regularly-planned close quadrangle, as it has a hall range on the south, containing the hall, kitchen, and Master's lodge, and chambers upon the other three sides. The buildings are low and of equal height throughout. There was no chapel, but, as I have stated above, two parish churches, to either of which the students could resort.

7. The first stone of the old court of King's College was laid in 1441. The area was so cramped that the formation of a regular quadrangle could not be attempted. The first stone of the chapel for the enlarged foundation was laid in 1446. The design for the enlarged college was never executed, and the large southern quadrangle has sprung up in quite modern times. A closed quadrangle was contemplated, of which the chapel would have formed the north side; the west side would have been occupied by the library, the hall, and the Provost's lodge; the south and east sides by chambers. Westward of the chapel would have been a cloister, like Wykeham's at Winchester and New College, Oxford, with a lofty detached campanile.

King's College was founded by King Henry VI. in 1441 for a rector and twelve scholars. Two years later the King's plan was greatly extended and the endowment was made for a provost and seventy scholars. The college was not completed by either Henry VI., Edward IV., or Richard III., although both of the Yorkist kings contributed to this Lancastrian foundation, but by Henry VII.

8. Queen's College was founded by Margaret of Anjou, wife of King Henry VI., in 1448 for a president and four Fellows. The annual revenues amounted to 200*l.* a year, a sum of much greater purchasing value then than now. The principal quadrangle was completely designed and finished in a few years. It is entered on the east side, which, as also the south, is occupied by chambers. The hall, kitchen, and buttery are on the west side, whilst the original chapel and the library were on the north.

The first stone of the chapel was laid for the Queen by Sir John Wenlock, who was afterwards slain at Tewkesbury, who caused to be engraved upon it (in Latin) the inscription, "The Lord will be a refuge to our Lady Queen Margaret, and this stone for token," a prophecy ill-fulfilled by the event. The building of the college was interrupted by the Civil Wars; still the President, Andrew Duckett, was successful in obtaining for it the patronage of Elizabeth Wydeville, Queen of Edward IV. The number of Fellows was raised to nineteen, and as many as forty-five scholarships were founded. The endowments were much increased by Richard III. and other benefactors. Soon after the erection of the great quadrangle a large range of buildings was erected to the west, with, what is an exceptional feature for Cambridge, a cloister-walk on the ground floor. The arches are plain four-centred arches of brickwork, of three chamfered orders.

9. Catherine Hall was founded in 1473 by Robert Woodlock, Doctor of Divinity, Provost of King's College, and Chancellor of the University, who dedicated it to St. Catherine, and appointed a Master and two Fellows, and some Fellow-Commoners. The buildings formed a quadrangle. The hall, library, and Master's lodge were on the north side, and the chapel on the south, projecting eastward beyond the eastern range of chambers. This college was wholly rebuilt in the seventeenth and eighteenth centuries.

10. Jesus College was made into its present form from the pre-existing Nunnery of St. Rhadegund about 1495. The nunnery was endowed by Malcolm IV., King of Scotland, who was also Earl of Huntingdon. It was dissolved at the petition of John Alcock, Bishop of Ely and Lord Chancellor of England. Alcock's foundation was for a Master, six Fellows, and six scholars. I have already treated of the conventual church. The distinctive features of this college are the cloister surrounding the original quadrangle inherited from the nunnery, the entrance court, and the road leading to the entrance-gateway and running between the walls of the Master's and Fellows' garden. The cloistered quadrangle was universal in monasteries, but not to be found in colleges, except in their secondary courts. In ecclesiastical buildings the Vicars' Close at Wells presents a near analogy to the ordinary college quadrangle.

11. Christ's College was built on the site of a hostel called God's House, which had been originally settled near Clare College, and endowed in 1442 by William Bingham, Rector of St. John Zachary, London, but removed to this site to make room for the building of King's College. Margaret, Countess of Richmond and Derby, obtained a licence from her son, Henry VII., to complete the college, gave it a body of statutes, and lived to see the quadrangle completed.

The entrance gateway is to the west; on the opposite or eastern side are the master's lodge and the hall, having at its south end the butteries, and beyond them the kitchen, external to the quadrangle. The chapel occupies part of the north side, but extends beyond the eastern range of buildings. The remainder of the north side, the whole of the south side, and the greater part of the west are occupied by chambers. The library is on the first floor, on the west side, to the south of the gateway. The buildings have been much transformed externally, but the ancient structure remains.

Tradition says that Lady Margaret of Richmond was influenced by Bishop Fisher of Rochester in the interest she took in Christ's College. The exercise of that influence is much more certain in the foundation of St. John's. Dr. Fisher was Master of Michael House, in the immediate vicinity of the Hospital of St. John the Baptist. It had fallen into decay and disrepute about the time when Fisher became chaplain to Lady Margaret. She had endowed Christ's College with the Abbey of St. Mary of the Meadows at Creyke in Norfolk, and she now concurred with Fisher in his desire to devote the Hospital of St. John to educational purposes. Her death took place June 29, 1509, and the college was not begun until two years later. The building of the first court was carried on without interruption until its completion. The college was opened by Bishop Fisher, July 29, 1516. One of the buildings of the hospital was altered into a chapel for the college, and formed such part of the north side of the quadrangle as was not occupied by the master's lodge. The lodge had an oriel resembling the bayed windows we find in the churches and chapels of the period. It gave the master a view of every part of the quadrangle. The west side comprised the hall, buttery, and kitchen. On the south was a range of chambers. On the east side was the library, with chambers beneath it. The second court is entered through the screens of the hall. There is nothing unusual in a passage open at both ends in this position. It was probably seen from the first that the college would extend in this direction. The entrance gateway is of the type of which that at Queen's is the first example. It is of red brick, with angle turrets, having stone quoins. There is an ogee canopy over the gate. The central shield, with the arms of England and France quarterly, is supported by the Beaufort antelopes. In the tympanum beneath is a rose. To the right (heraldically) is a large rose, to the left (heraldically) a portcullis. Both are crowned. Daisies, the special emblem of the Lady Margaret, are sown throughout the whole space beneath the string-course. The arms were formerly emblazoned in gold and colours, whilst the horns of the antelopes were gilt. Resting upon the finial of the ogee is a niche with a figure of St. John, beneath the usual Tudor canopy.

12. Of this noble gateway that at Trinity College may be considered a more homely version. There the entrances are double, one for carriages, the other for foot passengers. These have always reminded me of the tale of Sir Isaac Newton that he cut two holes in his door, a big one for the cat and a small one for the kitten.

13. Trinity College sprang up from a variety of hostels, of none of which are there now any but the most fragmentary remains. The history of this noble college itself falls without our period.

14. Magdalene College stands apart in more senses than one. It occupies the site of an ancient Benedictine establishment, dating from 1428. Different religious houses built different portions; Ely built one chamber, Walden a second, Ramsey a third. The general name of this composite fabric was the "Monks' Hostel." After the Dissolution the building was carried

on in succession by the Duke of Buckingham, Lord Audley of Walden, and the Duke of Norfolk. The buildings, with the exception of the Pepysian Library, were completed before the end of the sixteenth century. In the quadrangle of Magdalene is to be observed the corner staircase turret, a feature of Cambridge but not of Oxford colleges. The entrance gateway is unaccompanied by a tower. The hall, butteries, and kitchen occupy the east side, the hall being at the north end and the kitchen extending to the external south boundary of the buildings. On the north side is the chapel next the hall; the remainder was formerly occupied by the master's lodge. The south and west sides consist of chambers.

Magdalene College is at the foot of the Castle Hill of Cambridge, and I now end where I began, in Horace's phrase, "The close of a long journey and a long paper."

Mr. Butler Wilson, in proposing a vote of thanks to the lecturer for the trouble he had taken in preparing his paper, said that the subject of Cambridge was a very large one to deal with on one evening, and the ground which had been covered indicated that the lecturer had a very full knowledge of the subject, and he seemed to take it for granted that his audience knew something of Cambridge. The working out of the history of the collegiate buildings very quickly took them into antiquarianism, and perhaps, as a junior architectural association, consisting mainly of young students, they took more interest in that which was directly before them in daily practice. As a busy man, he found that however much he might be disposed to follow up the antiquarian subjects which presented themselves in the architectural world, he had to forego that pleasure, and the interest he took in buildings had to be focussed on that which might help him in his work. The colleges of Cambridge had all got histories; they had all been built to fulfil definite requirements, and in that there was a bond of sympathy between their builders and modern men.

Mr. Francis Hooper said he was glad to second the vote of thanks to Mr. Wood for his scholarly paper, and for showing his sketches of Cambridge buildings. It was true that the paper was more antiquarian than architectural, but there were few subjects that should be foreign to an architect, and, in a sense, the more antiquarian knowledge an architect possessed the better. It was interesting to learn how the University came to be established, also how much it was indebted to the Church for the educational work it undertook, and how the colleges, which began in a small way, had grown and had met the wants of the times. To what extent Cambridge University made the town, or the town the University, it would not be profitable to discuss. It was a happy fact—especially fortunate for architects seeking inspiration—that our two great Universities (Oxford and Cambridge) have been so little modernised. They were mediæval cities, and he believed that one could go to either place and throw one's self back into the life of the student of the sixteenth century, even the fifteenth century, when our national architecture was as virile as it ever had been. It was a matter, too, of great interest to recall the fact that the two universities, especially Cambridge, represented essentially a national architecture. He believed he was correct in saying that nothing could be found as a counterpart to the architecture of Cambridge in any part of the world; it was essentially characteristic of the scholastic and collegiate work of the fifteenth and sixteenth centuries. Many parts of the kingdom had been celebrated in times gone by for seats of learning. He had been much interested, during a short visit to Ireland, to find what great importance had been attached, especially in the middle ages, to the University at Lismore. Lismore is shown in our maps as a comparatively insignificant town, but in the middle ages it was a seat of learning resorted to not only by Englishmen, but by people from all parts of Europe. Unfortunately there was now nothing left of that University, and we should appreciate adequately the Universities we still possess nearer home. Did the lecturer know of any educational establishments in Europe in any way on a par with our Universities at Oxford and Cambridge?

Mr. H. Cayley said he once heard a lecture on Cambridge of about this period by Mr. Clark, of Cambridge, who showed a most interesting map of the town before many of the colleges were built, and from this it could be seen that at that time there were a number of churches and streets near the river. The river at that time was apparently the great highway of commerce, and no doubt the difficulties between town and gown were due to the manner in which the colleges encroached on the town. Mr. Clark showed how the colleges acquired some of their property. The beautiful open spaces which some of the colleges possessed were obtained by enclosing ground to which they had no right, and in the case of Trinity College the land was obtained by an exchange of land with the town, the college having no right to the property it was parting with.

The Chairman, in putting the vote of thanks to the meeting, said, as to the question of archæological papers, they had arranged a very varied syllabus for the present session. Perhaps, as had been said, the most popular papers were those which were a little more to the point as regards actual study or practice; but he did not think any one would underrate the value and importance of antiquarian papers such as they had listened to that evening. Without a knowledge of the history of buildings, we lost half the interest and delight of going over them. When we knew this history, the buildings could teach us lessons in our actual work, and also the reasons why certain forms were invented. As to the guilds referred to by Mr. Wood, he presumed they were practical guilds. Really, the origin of Oxford and Cambridge was very much like the origin of the Association, which consisted of members who banded themselves together as a guild in order to help on the training in their particular art or craft. It was to be regretted that Cambridge was in such low water financially, and that such a magnificent university should be rather languishing and unable to do as much as they ought to do for education. It was to be hoped that something would be done to aid the university. Great changes were taking place in regard to education in this country, and it would be interesting to compare the new colleges which Mr. Aston Webb was to build at Birmingham with what was to be seen in our old universities—not only as to structure, which would give expression to our new wants, but as what those wants are. At Birmingham, amongst other things, there was, he understood, to be a chair of brewing, and when they thought of that, the question whether Greek should be a compulsory subject or not at Cambridge seemed rather an archaic one. With the vote of thanks he should like to couple the name of Mr. A. N. Papworth, that gentleman having pointed out the illustrations shown by Mr. Wood.

The vote of thanks having been agreed to,

Mr. Wood, in reply, said in regard to his subject being archæological, so long as the Institute of Architects chose to examine in archæology, as they appeared to do more or less, it was certainly necessary that students should know a great deal about ancient buildings. He thought (though he did not wish them to take his guidance in practical matters affecting the examinations) that if they took a place like Oxford or Cambridge, or a cathedral town, and studied its edifices definitely and individually, making sketches and drawings of them, that would result in a better impression, a more definite idea, of architectural history than could be got by reading many books, or even by making many sketches of buildings widely separated. He had been very much struck with this idea in going over Cambridge, which he had known for long; and though he could not give the advice as an urgent recommendation, as he had not been in for the Institute examinations, he thought it might be practically useful. Another matter which had occurred to him was this: in Gilbert Scott's "History of Ecclesiastical Architecture in England," or in Rickman, everything was treated on an ecclesiastical basis, and he thought that our architecture had been treated too much in that way. Rickman's notes on castles were very disappointing, for all one seemed able to learn about them was that they were fortified places, whereas they were as valuable as churches. He (the speaker) thought that the plan of studying individual places would broaden our conception of Gothic architecture in the middle ages, and make that part of our studies more fertile. As to whether any other country could show such a large deposit of college buildings as England, he could not answer very positively, but he should say decidedly not. Colleges were not so much places of residence in foreign places as in this country; the foreign universities and the colleges abroad were gathering-places where people came from different parts, and divided into countries. This was much the same in Scotland—at Aberdeen, for instance. As to the guilds, there were two classes: the craft-guilds, which some people thought were the origin of our trade unions (much the larger number were trade guilds) and the religious confraternities.

The meeting then terminated.

The next meeting will be held on the 15th inst., when Mr. Max Clarke will read a paper on "The Sanitation of a Country House."

COMPETITIONS.

MANCHESTER FIRE STATION.—On the 31st ult. the Watch Committee of the Manchester City Council awarded the premiums for competitive plans for the erection of the proposed new fire station. A large number of plans were submitted by competitors in different parts of the country. The premiums have been won as follows:—First premium, 300*l.*, Messrs. Woodhouse & Willoughby and Mr. John Langham, of Manchester (joint plans); second premium, 200*l.*, Mr. Geo. Watson, Edinburgh; third premium, 100*l.*, Messrs. Magnall & Littlewood, Manchester. The new building is to be erected in London-road, on the triangular plot of land at the junction of Whitworth-street. It is estimated that the total cost, including land, will be over 100,000*l.*

EXTENSION OF BRISTOL POLICE-COURT.—New police-courts are to be built as part of the scheme of enlarging the petty sessional buildings in Bridewell-street, Bristol. The plans selected in competition for the extension were those sent in by Mr. Henry Williams.

INFANT SCHOOL, &C., BERWICK.—The Berwick School Board have selected the design submitted by Mr. J. Landell Nicholson and Mr. Fred E. Dotchin, as joint architects, of Newcastle, for their new infants' school, caretaker's house, playsheds, &c. It was an open competition, and altogether thirty-one sets of plans were submitted.

TROWBRIDGE ISOLATION HOSPITAL.—In the recent competition for the Trowbridge and District Joint Isolation Hospital, to be built at Trowbridge, Wilts, the designs of Mr. J. Hugh Goodman, architect and surveyor, of Reading, were selected for the first premium, and adopted by the committee for the erection of the hospital, in accordance with the recommendation of the professional assessor. There were over fifty designs submitted in the competition.

Illustrations.

VICTORIA MEMORIAL: DESIGN FOR TREATMENT OF BUCKINGHAM PALACE FRONT.

THIS illustration is a greatly reduced copy—more reduced than we could have wished—of Sir Thomas Drew's drawing showing his proposal for remodelling the façade of Buckingham Palace, to which we have already referred in our last issue.

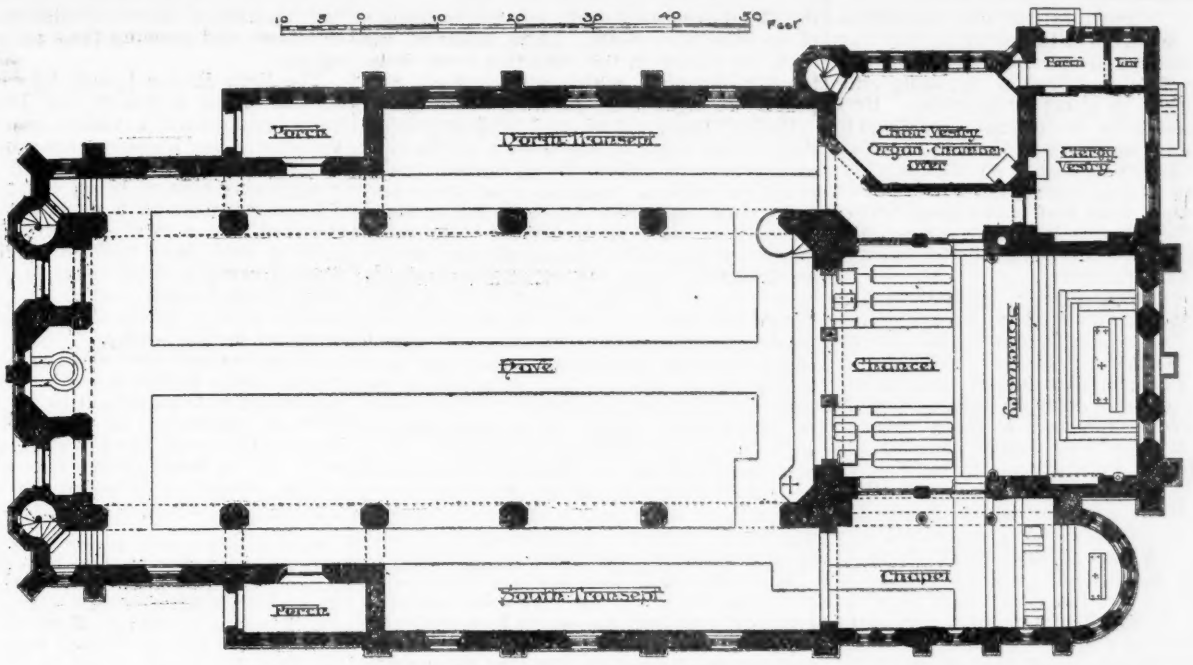
As our readers may remember, we have urged from the first that a part of the Victoria memorial scheme ought to consist of a new façade to Buckingham Palace, and that otherwise it would be a shabby and incongruous background to any memorial. Sir Thomas Drew has been of the same mind, and he here shows how he thinks it could be done, by bringing forward a wing at each end of the façade, so as to give shadow, and by introducing a columnar order between the windows, leaving the window openings as they are.

As treated here, the Palace front has a rich and dignified effect. Sir Thomas Drew estimates that the alteration might be carried out for about 100,000*l.* to 120,000*l.*

The drawing shows also the arrangement of the ground in front of the Palace, the placing of the Memorial, and the connexion of the central road with Constitution Hill and Buckingham Palace-road.

CHRIST CHURCH, LOWER SYDENHAM.

THE illustrations show the interior view looking east, and the exterior view from the



Christ Church, Lower Sydenham. Plan.

west end of the above-named new church, the foundation-stone of which was laid on Saturday, November 2, by the Rev. Canon Ainger, Master of the Temple. The exterior view was exhibited in the Royal Academy this year.

The main object of the design has been to get a lofty and effective building that would accommodate about 850 adults at a very reasonable cost, and to trust to the general massing and proportion, rather than to detail, for effect.

The main form of the plan is a nave 93 ft. long by 34 ft. wide, divided into five bays of 18 ft. centres. Broad processional passages are placed on either side, leading into north and south transepts, that on the south side terminating into an apsidal-ended chapel, and that on the north side into the organ chamber.

The baptistry is situated at the west end of the nave and has a vaulted roof, and is flanked on either side by a porch, over the whole of which is formed a small western gallery, which extends the entire width of the nave, and to which access is gained by two turret staircases, one on either side. These turrets are carried up externally the whole height of the building, and form one of the principal features of the west end elevation.

The chancel is 41 ft. 6 in. long by 28 ft. wide, with an altar, raised nine steps from the nave floor level. Spacious clergy and choir vestries are placed on the north side, with heating chamber under. The chancel is divided from the nave by a chancel arch, rising to the entire height of the nave, being filled with a rich traceried stone constructional screen, which forms one of the principal features of the design.

The roof, which is carried at one level through the nave and chancel, is of barrel form, with the addition of a coved cornice for future decoration.

The materials used are red brick relieved with stone dressings. Messrs. Goddard & Sons, of Dorking, whose tender for the work is 13,590*l.*, are the builders, and the architect is Mr. Geo. H. Fellowes Prynne, of Westminster.

HOUSE, BOWDEN GREEN, PANGBOURNE.

THE house is of red brick and red tiles—weathering dark upon the roofs. The work was carried out by Messrs. John Parnell & Son, of Rugby.

The joinery is all finished in white, except where of hard wood. The oak work in wall framings and ceilings is left in natural colour from the tool. In the floors it is waxed, but with a dull polish.

The lighting is by electricity, produced in the engine-house in the grounds. The voltage is a very low one and steam power has been found the most suitable.

Hot-water heating supplements the open fires, and a hot and cold water service is provided to the bedrooms.

Mr. Arnold Mitchell is the architect.

MAGAZINES AND REVIEWS.

THE *Art Journal* has a frontispiece of considerable interest—an etching by Mr. A. H. Haig of Buckingham Palace from the garden. Neither the garden nor the palace are ever open to the public, consequently this is a view known to few, taken from a standpoint obtained by special permission. The garden elevation of the palace, it may be observed, is a good deal better in an architectural sense than the entrance front. The number is largely occupied by articles on paintings and decorative art in the Glasgow Exhibition; the pictures illustrated are all well known, but the illustrations of decorative and industrial art include some things of novel interest. "How Wall-papers are Printed—by a practical paper-stainer," is a technical subject of interest in an artistic as well as in a mechanical sense, for a precise knowledge of the process of printing is not without its influence on the design. A short article on "The Piano as a Piece of Furniture" says much that has been said before as to the necessity, and the possibility now, of getting something better in the way of design than the stock model; but the two examples from Messrs. Broadwood's are not fortunately selected. One of these is the upright with folding doors, which we have before pointed out are in the way when hanging open on each side of the player—no musical amateur who "meant business" would take that form of piano; and in the grand piano by Mr. Chas. Allom the supports have not the appearance of strength which they should for a heavy instrument which has to be pushed about on the floor. In the reaction from the clumsy and lumpy appearance of the trade pianoforte-legs, designers seem inclined to go to the other extreme of want of solidity.

The *Art Journal* devotes its special annual number to the life and works of the painter whose real name is B. W. Leader Williams, but who wisely dropped the too common surname and became known in the world of landscape-art as Leader. He is not a painter with whom we can profess to have very much sympathy, but it must be admitted that his work, most carefully executed on its own lines, has pleased a greater number of people than, probably, that of any other contemporary landscape painter; and after all, as Mendelssohn once said in apology for inserting a rather light piece of music into a programme—"The people have rights."

The *Artist* gives some excellent examples of M. Charpentier's small bas-reliefs, to accompany an article on his work. The illustrations of metal-work by M. Scheidecker (a French artist in spite of his name) are of more value as warnings than examples in design.

The *Magazine of Art* has also an article on a medallist artist, Hans Frei, a Swiss artist and a native of Basle. He is not a Charpentier, but there is a great deal of interest in his more quiet and what may be called more *bourgeois* work; the head and bust called "Lauretta" has a great deal of character. It is observed that "his success lies in his strong originality and in his adaptation of mediæval style to modern technique," and the remark seems justified by the examples of his work given here. To architects an interesting article is the short one on the proposed new fish market at Venice, for which Signor Laurenti has made a design with an open loggia of pointed arches in the ground story, on columns without bases, the whole in fact borrowed from the suggestion of the Ducal Palace: old Venice revived. It is a question whether it will not appear too palpably a revival, a piece of modern-antique; but the effort seems to be prompted by a desire to do something in harmony with the ancient city.

The *Berliner Kunst*, of which the first number has reached us, appears to be a kind of supplement to the *Berliner Architektur-Welt*, intended to deal solely with furniture and industrial art; the present number being almost entirely occupied with illustrations of furniture, from which the English reader may form an estimate of the prevalent German taste in furniture. Some of the designs given are clever, but the mistake of them all is that they are too clever, too restless in style, and show a search after ingenuity and novelty rather than beauty. The grand piano figured on pp. 20 and 21 strikes us as hideous in design; the English new designs, if not always quite satisfactory in a structural sense, at all events show good taste and refinement. Among all the furniture illustrations the best thing is the chair by Keller & Reiner, of Berlin; its lines are simple and arise from a natural and unforced treatment of the construction. The *Berliner Architektur-Welt*, however, seems still to keep up its own industrial art section. In its latest number the most interesting architectural illustration is that of a curiously designed apartment house by Herr Paul Hobbe, in the Alt-Moabit; a house diversified with figures in low relief, fluting on the walls, &c., and with some varied and certainly very original treatment of some of the doorways, somewhat Egyptian in feeling; in that on p. 273, however, the cross-lintel looks a great deal too much like a block put in the rough to be carved subsequently. What is supposed to be the merit of the coloured scrawl by Herr Rieth which is given a page to itself, we cannot divine.

The *Architektonische Rundschau* is cosmopolitan apparently only as far as German work is concerned; that is, it illustrates work of the Germanic group of nations, but nothing English or French seems to be admitted. The illustrations are so well executed that it is vexatious to find them bestowed too often on designs which seem to have nothing to recommend them but eccentricity. The coloured print of the theatre at Meran, however, with its cream-white walls, red-tiled roofs, and details half Greek, half Roman, is a building of pleasing and suitable character; Herr Dülfer, of Munich, is the architect. A Vienna house

by Professor Wagner of that city, a comparatively flat front over-run for a great portion with a flowing floral and spiral ornament presumably in *sgraffitto*, is a type of the strife after new treatment in street architecture. Herr Grässel's design for the entrance buildings to the new north cemetery at Munich, of which the central feature is a large square assembly-hall with an octagon cupola, the whole treated on very simple lines and with a good deal of sculpture decoration in low relief, is a pleasing conception, though perhaps a little too naïve in its architectural treatment.

The *Quarterly Review*, among various interesting articles on subjects not within our province, has a valuable and instructive one on "Antique Gems," ostensibly a review of Professor Furtwängler's important work, but in reality a general essay on this fascinating subject. Those who wish to feel a new and more vivid interest in Greek gems should read this article and study the British Museum examples in the light of it. "The South Pole" is an article on a subject which, though not connected either with art or construction, may be mentioned here as one which ought to interest all Englishmen without distinction of profession; and those who wish to get an impression of the chivalrous barbarities of old French duelling may find a most interesting and amusing disquisition on the subject in the review of the new edition of Brantôme.

The *Edinburgh Review* contains an article on the Glasgow School of Painting, which quite merits an article, but this one is written in what we call a very "provincial" spirit of criticism, the subject being treated entirely from the point of view of the Impressionist clique, as is obvious when we find that one question put in regard to the work of the Glasgow School is "how do they compare with their contemporaries of the South, like Mr. Rothenstein and Mr. Steer?" The best productions of the Glasgow School are quite beyond the productions of such artists as those named, and it is indeed almost an insult to Mr. Lavery to couple him with them. The writer is equally at sea as to what he calls the "lamentable degeneration of the modern Glasgow architects" as compared with "Greek Thompson"; a phrase which is really almost impertinent. Thompson was a man of genius, but a greal deal of his work must be regarded as hopelessly *passé* now, and it is in any case not very well suited for the Scottish climate; and the fact is that Glasgow contains a larger proportion of architects who are really artistic and original designers than perhaps any other provincial city. The *Edinburgh Review* under its present management seems to have fallen sadly from the high standard of philosophic art-criticism which used to characterise it; it has descended to the level of the average art-critic.

Feilden's Magazine contains long articles with illustrations on electrical and other machinery at the Glasgow Exhibition, but it was sent too late for us to go into the contents further than their general mention.

In the *Century* Mr. Timothy Cole starts a new series of wood engravings of "Old Spanish Masters." The one here given, that of the three-quarter length portrait of Saint Elizabeth of Zurbaran, is a perfectly beautiful bit of wood-engraving, and makes Zurbaran's work look more attractive than it generally does in the painted originals. In the same issue is an article on one of the most interesting practical topics of the moment—"The dirigible balloon of M. Santos-Dumont." The article, by Mr. Sterling Heilig, is written with the knowledge and consent of the inventor, and gives a good account of the situation up to the present moment. We call the subject a practical one, because M. Santos-Dumont has, for the first time, succeeded in giving some promise of being able to make it so.

Harper contains an illustrated article on "Old St. Saviours, Southwark," by Mr. Charles E. Russell, who calls it in his sub-title "The Elizabethan Actors' Church." The illustrations are architectural, but the writing is merely in regard to the historic associations with the church, which, however, are interesting enough, and should, as the writer observes, be more familiar to Englishmen than they are. Not infrequently we find that Americans know more about our antiquities than we do ourselves. The rebuilding of the nave is not alluded to. An article on "Athenian Conceptions of a Future Life," by Dr. Daniel Quinn, is an attempt to gather from Greek funereal monuments an idea as to the light in which the Greeks regarded death and the probability of re-union after death. Little, however, can really be gained in this direction from sculptured monuments which are—perhaps purposely—so vague and passionless in expression.

Under "The Field of Art" *Scribner* prints a short double essay, by two writers, on the ideal arrangement of pictures in an exhibition such as the Paris Salon, so as to hang pictures in harmony with each other and with the rooms in which they are placed, instead of jumbling together pictures of all classes of subject and of art indiscriminately. What is said is mostly quite true, as an ideal; but it is an ideal practically impossible to carry out, unless the number of pictures were reduced by two-thirds, and the time and cost incident to hanging them multiplied by three. The reduction of the numbers would be an advantage to the public; but even then, under the circumstances in which an annual exhibition on a large scale is organised, the other recommendations could not practically be carried out. After all, there is such a thing as being too fastidious. People ought to be able to enjoy a really fine picture apart from its surroundings.

In the *Pall Mall Magazine* Mr. Francis Watt continues his article on "The Rebuilding of London," devoting his article to Newgate, of which there are a good many illustrations, as well as a head-piece showing Mr. Mountford's building which is to take its place. The writer, however, does not seem to be the least aware that Old Newgate is architecturally a remarkable building, or that it was designed by an eminent architect, whose name is of course (in the usual way in England) entirely omitted from the account.

The *Gentleman's Magazine* contains a short but suggestive article by Dr. E. W. Adams on "The Old Science and the New." The point of it is to show how some of the old scientific writers often just touched the confines of a modern discovery but failed quite to grasp it, or put away the idea as a fancy. There are two interesting quotations from Bacon ("Novum Organum") in one of which he states his idea of heat as "a mode of motion" in language which might almost pass for that of a modern writer; in another he remarks that a strange doubt sometimes assailed him, as to whether we see the images of the sun and the stars as they are at the moment, or was the impression received really that of an image of some time ago; in other words, did light take time to travel? He was on the very verge of a new truth, but dismisses the idea again. In the same number Mr. Elland Gore gives some account of Houzeau, an eminent Belgian astronomer of the nineteenth century, whose name is little known beyond the world of astronomers; and Mr. S. H. Ditchfield, F.S.A., contributes what will be more immediately interesting to some of our readers—an article on "Brass-rubbing," in which a good deal of information is compressed into a small space.

International Notes, a small monthly magazine, which gives short notes of artistic doings in different parts of the world, publishes also a good illustrated essay or lecture on Greek art by an architect, Mr. C. J. Tait, of Exeter; whose name, however, is mis-spelt "Tate."

Knowledge contains a paper on "The Sinking of Large Stones through the Action of Worms," by Mr. Charles Davison, well known as a special student and investigator of earthquakes. The present paper is based on some experiments and observations by Darwin and by his son, Mr. Horace Darwin, of which the results are given, with a diagram showing the method whereby provision was made to minutely measure the movements of a stone about 18 in. diameter and 2¼ in. thick. The stone was found to be in a continual state of vertical oscillation; sometimes sinking further into the ground, at other times rising again, but we do not see that the movements were specially traced to the influence of worms; they appear to have been more the result of changes of weather. The subject, however, is of considerable interest in any case.

The *Leisure Hour* contains an article by the Rev. James Johnston on "Chained Books in English Churches and Cathedrals," chiefly notes on the present existing examples of this old custom, with illustrations of some of these chained libraries. In the same issue is the first instalment of a series of articles on our lighthouses, under the title "The Coastwise Lights of England" (the expression is from a poem by Mr. Kipling), by Miss Gertrude Bacon, popular of course rather than scientific, but which may be of use in giving the general public some information about this most interesting class of structures, and drawing their attention to the subject.

The *Essex Review* (quarterly) continues the subject of the Dykes of the Thames, their history and present condition, and the work of Vermuyden, the Dutch engineer, in the seventeenth century. The Dutch engineers were brought over here as being experts in the art of keeping the sea off a flat country, and were regarded with a good deal of jealousy in the districts they dealt with in England. The number contains illustrations of old Walton-on-the-Naze Church, and of the quiet unpretending country house called Bradwell Hall, destroyed by fire in 1839.

Macmillan includes a short but strong article by Mr. Lewis F. Day on "The New Art," an idea which he truly says is as far from possibility of realisation as the Gothic revival. Regarded as the outlet of youthful restlessness, he thinks, its extravagance may pass; as the serious expression of mature art it lacks coherence, sober sense, and sanity:—

"The theory is, that Nature is enough, that an artist has only to look at her and she will guide him in the right path—but there is absolutely no shadow of a reason why Nature should point out the way of art. In relying wholly upon Nature the artist is no better advised than in trusting altogether to art. The New Art, indeed, cannot be said to breathe the spirit of Nature; but professed allegiance to Nature does not lead always to natural results. It has resulted before now in ornament more suggestive of railway signals than of any natural growth; it has resulted also in the New Art; at least, its votaries take shelter under the name of Nature. And, until now, it has hardly been denied that the artist, study Nature as he may and as he must, is bound to study the methods of art also, aye, and the works of artists before him; or, admirably as he may do, he will fall short of his possible achievement. The sincere artist seeks always the best, not the newest expression of his personality."

The *Church Builder*, the quarterly record of the Incorporated Church Building Society, gives illustrations and description of Mr. Caröe's Church of St. John, High Wycombe, and of the small mission church at Arlesey, near Hitchin, of which Mr. Ryan-Tenison is the architect. From Mr. Micklethwaite's amusing and trenchant "Occasional Notes on Church Furniture and Arrangement," dealing in this issue (Chapter 9) with the subject of "Cheap Churches," we quote the following, which is sadly too true:—

"As a rule, the only thing about the plan which the committee concern themselves much with is the number of the 'sittings,' and everything which does not contribute to that is cut down to the utmost. Then it comes to building. But to carry out substantially anything like what appears on the show drawings would cost a good deal more than the sum which may be spent. Some semblance to the drawings must, however, be kept, so the walls are made of the thinnest and the roofs the slightest which will pass muster with the several authorities whose sanction has to be obtained. The materials are of the poorest. The foundations are shallow, and such furniture as there is of the meanest. But there is a profusion of trumpery Bath stone trimmings, and perhaps a lean steeple besides.

When it is new and redolent of varnish the committee are satisfied. It all seems very smart in their eyes, and they think their money well spent. A few years of use show them its inconvenience, and a few more unpleasantly force upon their attention that superficial smartness is not a good wearing quality. The building begins to fail for lack of the substance which has been squeezed out of it to pay for the show. Large sums have to be spent on its repairs, and in half a century it may be quite worn out."

SANITARY INSPECTORS' ASSOCIATION.

THE annual general meeting of this Association was held at the Carpenters' Hall, London Wall, on Saturday evening. Mr. W. Wilkinson, the new Chairman of the Council, presided, and in his inaugural address congratulated the members on the financial stability of the Association, the capital account showing assets of 3,359*l*. He thought the Association had entered upon its session's work with more promise than had ever before been the case, because from the highest to the lowest throughout the land there was more appreciation of sanitary work than had ever before been the case. The King had, almost in his first utterance after ascending the throne, sounded a note for the better housing of the poor. The Association represented those who had in their dull routine of work to carry out the drudgery of the sanitary administration, and they, in an

equal degree with others in a more exalted position, shared the desire that there should be a better and happier condition of life for everybody. The sanitary inspectors, along with many other sanitary administrators, voiced the desire that, inasmuch as public health was a national asset, the operations of all sanitary authorities should be controlled by a central body which would be supported from Imperial sources and have as its chief functions the protection of the nation's health. They further contended that, inasmuch as public health was a nation's wealth, that local administrative bodies should be allowed a sufficient period for the repayment of the cost of the work which was necessary to secure that good.

Sir J. Crichton Browne was elected President for the ensuing year, and the Chairman congratulated the members on securing one so eminent and learned for that position.

STANDARD SECTIONS IN IRON AND STEEL STRUCTURE.

THE following remarks on this important subject form a portion of the address given to the Institution of Civil Engineers on Tuesday last by their President, Mr. Charles Hawkesley. They are worth the consideration of architects as well as engineers.

"Most British civil engineers have probably suffered inconvenience, and their clients not unlikely have sustained loss, owing to the absence in Great Britain of standard sections of iron and steel. For example, when designing a roof or a bridge, the engineer selects from the book of some well-known firm the sections of angle and tee iron best suited to his requirements, the contract for the work is let, and presently the contractor asks if he may be allowed to substitute another section for one of those selected, as that particular section is out of stock, and is either no longer rolled, or the quantity required is too small to induce the maker to put in the rolls to produce it. These difficulties have led to the adoption in Germany and America of standard sections of iron and steel with great advantage to the producer, the middleman (if any) and the buyer. The producer can cheapen the cost of production, because he can roll considerable quantities of any given section at one time, and place in stock any surplus. The middleman (if any) can buy in the cheapest market, and be sure to find an outlet for his purchases; the buyer can feel sure of obtaining the section that he requires from one firm or another with the least amount of delay, and at the least cost.

For some time past the Council of the Institution of Civil Engineers has realised the serious difficulties and disadvantages under which British manufacturers are placed by the lack in this country of some acknowledged standards. Our trade and interests are more far-reaching and world-wide than those of any other country, and this makes the question of standardisation more important, but at the same time more difficult. The Council of the Institution of Civil Engineers therefore approached the Institution of Mechanical Engineers, the Institution of Naval Architects, and the Iron and Steel Institute with a view to taking up this subject, and a strong and influential committee representing these four institutions was formed. The Committee decided in the first instance to call for evidence from all the various industries interested and affected as to whether they were favourable or not to the adoption of standards in the principal various rolled iron and steel sections used in building construction, railways, bridges, &c. The Committee sat for three days in June last, hearing evidence from all parts of the country and from those representing our colonies and dependencies, and the evidence as to the desirability of issuing standard sections and standard specifications was so unanimous, that the Council of this Institution decided to accept the Committee's recommendation and to proceed with the work forthwith. The work of the Committee has been divided into the four sections following:—

Section.	*Chairman.*
(1) Bridges and general construction	Sir Benjamin Baker.
(2) Railway rolling stock under frames	Sir Douglas Fox.
(3) Rails.....	Sir John Wolfe Barry.
(4) Ships	Mr. Arch. Denny, of Dumbarton.

These four Committees, on which the leading men of their several branches of industry are associated, are now at work standardising the various sections used in their particular branches of industry.

The evidence before the Committee was interesting as showing the various methods in which the different countries carried out their work. For instance, in America, where the American Society of Civil Engineers has issued standard sections for rails and standard specifications, the rolling-mill makers will, in most cases, only roll to these sections. It transpired that from time to time various enquiries had been sent to America from this country for tenders for large quantities of rails and of other materials that were needed by companies in this country; but in nearly every case the reply was that 'unless you take our standards we regret we do not see our way to quote.' On the other hand, some instructive instances of the waste of time and money that occurs in this country for the want of standard sections were laid before the Committee. Many might be cited, but one instance must suffice. The case in point was a section incorporated in a bridge for one of our colonies. The average cost of the material was 8*l.* 10s. per ton, but one of the sections specified was of such an odd size and the quantity of this size was so small that the section had to be made by a blacksmith at a cost of from 28*l.* to 30*l.* per ton. The multiplication of the number of sections is often quite unnecessary, and a striking case of the money that is lost or wasted in this way occurred a short while ago, where certain sections were specified in a bridge. When the contractor endeavoured to obtain these sections, and although they were contained in the price list issued by the makers, the makers themselves had none of the sections in stock, and could not give delivery. The contractor therefore worked out a girder of similar strength, incorporating therein sections which could be readily obtained, and the saving on this item alone was over 600*l.* Innumerable instances of this kind could be multiplied did the time at my disposal permit of it. It is therefore with a view to lesson the cost of and expedite the carrying out of the works designed by engineers, as well as to enable the British manufacturer to meet the keen competition which is now threatening even our home markets, that the Institution of Civil Engineers has taken in hand this important matter.

It may be interesting to quote what Germany and America have done in the direction of standardising rolled sections.

Germany has sixty-seven various standard sections and America has only forty-nine, whereas Great Britain has no standard sections, and uses over 170 different sections. The need of standards for rails in connexion with electrical traction is being particularly felt. It was recently shown that there were no less than seventy-one different sections of tram rails, many of the municipal engineers designing their own sections, only slightly differing from those of their neighbours, but having just sufficient difference to cause considerable expense and trouble should their tramway system ever become connected to the neighbouring system. The tramway industry of this country is developing every day, and it is highly desirable that standards should be adopted before the industry begins to suffer more acutely from the want of them.

The American practice is to reduce the numbers of sections as much as possible; but this is, to my mind, travelling too far in the opposite direction. Care must be taken to provide a considerable variety of sections in the first instance, and to provide for adding to them from time to time as occasion may require.

The chief disadvantage of standardisation, it has been urged, is that a fixed set of sections tends to cramp originality of design, and this is not merely a groundless fear, for the American manufacturers have in many instances absolutely refused to roll anything outside their stock patterns. Such a course would, however, doubtless soon provide its own remedy, for if anything was to be gained by the adoption of a new design, a sufficiently high price would probably be offered by the buyer to induce some foreign manufacturer to execute the order if our own countrymen persisted in their refusal to do so.

I feel assured that the action of the Council in this matter will be hailed with satisfaction by the members of this Institution, and more especially by those of our professional brethren who are resident in India or our colonies, and I hope the time is not far distant when the system of standardisation may be extended to other engineering requirements, as, for instance, to cast-iron pipes, always, however, bearing in mind that engineering designs must not be reduced to the level of the manufacturers' standards, but rather that the standards must be kept abreast of the requirements of the engineer."

ENGINEERING SOCIETIES.

SOCIETY OF ENGINEERS.—At a meeting of the Society of Engineers held at the Royal United Service Institution, Whitehall, on Monday evening last, Mr. Charles Mason, President, in the chair, a paper was read on "The Main Drainage of Ilford," by Mr. Roger Gaskell Hetherington. The author observed that the first drainage scheme was prepared by the late Mr. Brundel in 1882, when the population was only 7,500. The present scheme has been designed for a population of over 100,000 by Messrs. John Taylor, Sons, & Santo Crimp, and the old system has been incorporated with it. The drainage area is such that one portion of it only can be drained by gravitation. The various lines of sewers and their functions were described, and details of the construction of the main sewers were given. The general screening and pumping arrangements on the low-level sewers were also described. The outfall works, as first constructed, became in time inadequate, and they were greatly enlarged in 1898, and the present system of dealing with the sewage was then started. This method consists of treating the crude sewage with milk of lime and ferrous sulphate and then passing it through settling tanks. From the settling tanks the effluent is taken into coke breeze bacteria beds, and from thence to the river Roding, the sludge left in the tanks being pressed by sludge-pressing machinery. Owing to the works being required to deal with a considerably larger flow than that for which they were designed, the effluent has become unsatisfactory, and other modifications in the works are now being undertaken. The chief of these is the construction of an entirely new outfall to the river Thames. This effluent pipe will discharge into the Thames below the London Northern Outfall at Barking. As this outfall pipe, which is 2 ft. 6 in. in diameter, passes through a large tract of land lying below high-tide level, elaborate precautions have had to be taken to prevent tidal water being admitted to this low-lying land by any failure of the pipe. The scheme as a whole presents some interesting points as regards meeting the ever-recurring problem of treating the sewage of a district with a rapidly increasing population, without discarding the existing system, which was never designed for great enlargement.

ARCHITECTURAL SOCIETIES.

EDINBURGH ARCHITECTURAL ASSOCIATION.—The annual business meeting of this Association was held in the New Rooms, No. 117, George-street, on Wednesday evening, October 16th, Mr. Henry F. Kerr, President, in the chair. The reports of the Hon. Secretary, Hon. Treasurer, and the Conveners of the various Committees were submitted and approved. The resignation of Mr. Thomas Fairbairn, Hon. Secretary, was intimated on account of his health. Mr. Fairbairn has acted as Hon. Secretary of the Association for the long period of twenty years, and a very warm tribute was paid to him for the splendid service he had rendered the Association during his lengthy term of office, to which Mr. Fairbairn feelingly replied. The most interesting and important business was the formal amalgamation of the Edinburgh Architectural Society with the Edinburgh Architectural Association. The arrangements for the amalgamation were concluded some time ago, but this was the first joint meeting held. Mr. Henry F. Kerr was re-elected President for the coming session with the following other office-bearers:— Vice-Presidents, Mr. A. Hunter Crawford and Mr. A. Lorne Campbell; Hon. Secretaries, Mr. William M. Page and Mr. Colin B. Cownie; Hon. Treasurer, Mr. John Johnstone; Hon. Librarian, Mr. John Watson; Committee of Management, Messrs. James Bruce, W.S.; Thomas Ross, F.S.A. (Scot.); George Henderson, Hay Lamont, Alfred Greig, and A. F. Balfour Paul. The Amalgamated Association now comprises

Fellows, Members, and Associates. The Associates' section is to have a series of meetings and papers of its own, and has appointed the following office-bearers :—Chairman, Mr. J. Stuart Syme; Vice-Chairman, Mr. J. F. Matthew; Hon. Secretary, Mr. J. McIntyre; Committee, Messrs. J. Sidey, D. Davidson, Hay Lamont, J. Jerdan, B. S. Murphy, and J. A. Arnot. On Monday evening last the formal opening of the rooms took place, when the President and office-bearers held a reception, at which about 250 ladies and gentlemen attended. Sir George Reid, President of the Royal Scottish Academy, declared the rooms open, and Bailie W. S. Brown, as representing the city, and Professor Baldwin Brown, as representing the University, addressed the gathering.

ARCHITECTURAL ASSOCIATION OF IRELAND.—An Exhibition of Drawings, prepared by members of the Association, has recently been held in the rooms of the Royal Institute of the Architects of Ireland, by the kind permission of the President and Council of that body. The drawings consisted of the competitive works of members for the various prizes offered during the past session. Among these were nine large sheets of accurately-measured drawings of St. Patrick's Cathedral, Dublin, executed by Mr. T. A. Rockett, who has earned the prize—the Association Travelling Studentship—in competition for which they were prepared. Another set of measured drawings were shown of Mellifont Abbey, by Mr. A. C. Scott, of Drogheda. Seven sets of drawings were shown which had been prepared in competition for the prize offered by the Royal Institute of the Architects of Ireland for the best design for a Technical School. The prize was awarded to the drawings by Mr. Charles Powell. Three sketches of the Campanile in the Quadrangle at Trinity College were on view, one by Mr. L. O'Callaghan taking the Beckett Prize. The class drawings which were exhibited demonstrated the fact that real hard work is done by the members, and that the object for which the Architectural Association of Ireland was founded is being very well kept in view—that is, of providing a school wherein the younger members of the profession in Ireland may acquire knowledge of design and draughtsmanship.

THE LONDON COUNTY COUNCIL.

THE ordinary weekly meeting of the London County Council was held on Tuesday, in the County Hall, Spring-gardens, Mr. A. M. Torrance, Chairman, presiding.

Loans.—On the recommendation of the Finance Committee, it was agreed to lend Poplar Borough Council 7,000*l.* for electric lighting; Woolwich Borough Council, 1,910*l.* for street improvement; Stepney Borough Council, 2,050*l.* for similar purposes; and Stepney Borough Council, 10,000*l.* for electric lighting.

London Water Supply.—The Water Committee recommended as follows :—

"(*a*) That a Bill be promoted by the Council in the Session of 1902 for the purchase by the Council of the undertakings of the eight Metropolitan water companies, the Bill to be on similar lines to that of last Session.

(*b*) That it be referred to the Parliamentary Committee to prepare and submit to the Council the necessary Bill for carrying out the above recommendation; and also to prepare and submit the necessary Water (Finance) Bill."

After a long discussion the recommendations were agreed to.

Improvement.—It was agreed to contribute 1,487*l.* towards the cost of widening Hare-street, Woolwich, at Nos. 1 to 37.

Tenders.—The following recommendations of the Parks and Open Spaces Committee were agreed to :—

"That the gravel and hardcore required for the formation of the new cycle track at Parliament Hill be obtained from Mr. H. Barnaby, at a cost of 7*s.* 9*d.* a yard for gravel and 3*s.* a load for hardcore.

That the offer of Mr. H. Clarkson, to supply and cart to the Victoria Embankment the soil required for the tree-pits at 5*s.* a load, and for carting away the old soil at 5*s.* a load, be accepted."

The Bridges Committee recommended, and it was agreed :—

"That the supplemental estimate of 1,535*l.* submitted by the Finance Committee in respect of electrical lifts, fans, pumps, wiring, lamps, and fittings at Greenwich tunnel be approved; that the amended tender of Messrs. Easton & Co., amounting to 7,534*l.* 2*s.*, be accepted."

The Highways Committee recommended, and it was agreed :—

"That, subject to the result of the usual inquiries proving satisfactory, the tenders of Messrs. Walter Scott, Ltd., be accepted, for the supply, (A) for the sum of 25,442*l.*, of the track-rails and fastenings; and, (B) for the sum of 25,334*l.*, of the slot-rails, conductor-tees, and fastenings required in connexion with the reconstruction, for electrical traction, of the London County Council Tramways, between (*a*) Westminster Bridge and Tooting, (*b*) Blackfriars-road and Kennington, and (*c*) Waterloo-road and St. George's-circus.

That Messrs. Walter Scott, Ltd., be allowed to sub-let to the Helicoid Lock-nut Co., of Acton, the supply of the bolts and nuts under contracts (A) and (B), and to another sub-contractor, to be approved by the Engineer (Dr. Kennedy), the supply of the tie-bars under contract (B), and also, under contract (A), to employ the Coghlan Steel Co., of Hunslet, to roll the fish-plates and other small work, for which Messrs. Scott will themselves manufacture the metal.

That, subject to the result of the usual inquiries proving satisfactory, the tender of Messrs. J. G. White & Co. be accepted for the execution, for the sum of 171,145*l.*, of the roadwork and platelaying required in connexion with the reconstruction, for electrical traction, of the London County Council Tramways between (*a*) Westminster Bridge and Tooting, (*b*) Blackfriars-road and Kennington, and (*c*) Waterloo-road and St. George's-circus.

That Messrs. J. G. White & Co. be allowed to sub-let to Messrs. W. Griffiths & Co. the roadwork, and to the Lorain Steel Co., of Ohio, U.S.A., the special work (namely, points and crossings)."

Railways and Rehousing.—On the motion of Sir J. Dickson-Poynder, it was resolved :—"That, in the opinion of the Council, it is desirable that in all cases when railway companies seek powers from Parliament necessitating schemes for rehousing persons displaced, the companies should, in lieu of being bound to undertake the work themselves, pay to the Council the equivalent in money of the cost of carrying out such schemes, the execution of the work being left to the Council, to be dealt with in such manner as they may think best, and that the Railway Commissioners should be constituted by Parliament capable of determining the amount to be paid in each case; and that it be referred to the Parliamentary Committee to consider and report in what manner the matter can be brought to the notice of his Majesty's Government."

Other matters were disposed of, and the Council adjourned.

APPLICATIONS UNDER THE 1894 LONDON BUILDING ACT.

THE London County Council on Tuesday dealt with the following applications under the London Building Act, 1894. Unless otherwise stated, consent was given on conditions. The names of applicants are given between parentheses :—

Lines of Frontage and Projections.

Bermondsey.—A building, to be used as a girls' school, on the north side of New Kent-road, Southwark, next Buckenham-square (Mr. W. C. Jones for the Governors of St. Saviour's and St. Olave's Foundation).—Consent.

Clapham.—A one-story shop commenced to be erected on the forecourt of No. 650, Wandsworth-road, Clapham, abutting upon Queen's-road (Mr. R. E. Smith for Mr. M. Jones).—Consent.

Hampstead.—A one-story bay window in front of a house in course of erection on the north side of Elsworthy-road, Hampstead, to be known as "Shepherds Well" (Mr. A. F. Faulkner for Mr. W. Willett).—Consent.

Hampstead.—The erection of a brick, wood, and tile porch to a house in course of erection on the north side of Elsworthy-road, Hampstead, to be known as "The Warren" (Mr. A. F. Faulkner for Mr. W. Willett)—Consent.

Hampstead.—A one-story bay-window in front of a building in course of erection on the north side of Elsworthy-road, Hampstead, to be known as "The Warren" (Mr. A. F. Faulkner for Mr. W. Willett).—Consent.

Kensington, South.—A stone hood over the entrance to No. 21, Kensington Gore, Kensington (Mr. A. O. Collard for Sir John Hutton).—Consent.

Lewisham.—Balconies over the entrances to fifteen houses to be erected on the west side of Lawrie Park-road, Sydenham (Mr. E. Tompkins).—Consent.

Lewisham.—A one-story shop on part of the forecourt of No. 262, Brockley-road, Lewisham (Mr. J. H. Waterworth for Mrs. M. A. C. Beacock).—Consent.

St. George, Hanover-square.—An iron and glass shelter at the entrance to No. 15, Wilton-road, Pimlico (Mr. C. Gerli).—Refused.

Strand.—An iron and glass shelter over the entrance to the Villa-Villa Restaurant, Nos. 37 and 38, Gerrard-street, Soho (Mr. R. H. Kerr for Mr. Tarvin).—Refused.

Wandsworth.†—A wooden porch at the entrance to No. 1, Rodway-road, Roehampton (Mr. J. Harvey for Miss P. Higgins).—Refused.

Westminster.—A one-story shop in front of No. 133, Victoria-street, Westminster (Messrs. Bull & Esdaile for Messrs. Symons & Co., Ltd.).—Refused.

Width of Way.

Wandsworth.—Stable buildings at the Tooting Bec Asylum, on the west side of Church-lane, Tooting (Messrs. A. & C. Harston for the Metropolitan Asylums Board).—Consent.

St. Pancras, East.—Two cottages at the rear of Nos. 18 and 20, Jeffreys-street, Kentish Town-road (Mr. T. B. Westacott).—Refused.

Islington, West.—A stable building at the rear of Nos. 42, 44, and 46, George's-road, Holloway, with the external walls at less than the prescribed distance from the centre of George-street-mews (Mr. S. Allen).—Refused.

Lines of Frontage and Width of Way.

Clapham.—That the application of Mrs. R. S. Gray for an extension of the period within which the erection of eleven houses with bay-windows on the east side of Loats-road, and seven houses with bay-windows on the west side of Lyham-road, Clapham, was required to be commenced, be granted.—Agreed.

Width of Way and Space at Rear.

Hackney, South.—Three-story dwelling-houses and a boat-house on the south-west side of Middlesex-wharf, Lea Bridge-road, Hackney (Messrs. J. G. & H. G. Needham for Mr. T. Marvell).—Consent.

Lines of Frontage and Construction.

Hammersmith.—A coal transporter on the West Middlesex Waterworks Company's land on the north and south sides of Upper Mall, Hammersmith, and extending over such street (Mr. M. W. Hervey for the West Middlesex Waterworks Company).—Consent.

Hampstead.—The retention of a brick fodder store and a wood and brick tool-shed at Cranbrook-stables, Nutley-terrace, Hampstead (Messrs. White & Page for Mr. J. Duveen).—Refused.

Formation of Streets.

Clapham.—That an order be issued to Mr. C. G. St. John, sanctioning the formation or laying-out of a new street for carriage traffic, to lead from Navy-street to Voltaire-street, Clapham. That the name Army-street be approved for the new street.—Agreed.

Poplar.—That an order be issued to Mr. H. Hooper, refusing to sanction the formation or laying out of new streets for carriage traffic out of East Ferry-road, Millwall (for Lady Margaret Charteris).—Agreed.

Means of Escape from Top of High Buildings.

Holborn.—Means of escape in case of fire, proposed to be provided on the top story of the front portion of a building on the site of Nos. 120, 122 and 124, Southampton-row, Bloomsbury, for the persons dwelling or employed therein (Mr. P. E. Pilditch for Mr. A. E. Parker).—Refused.

Height of Buildings.

City.—A block of offices on the western side of Lloyds-avenue, Fenchurch-street, City (Messrs. Davis & Emmanuel for Lloyds-avenue Estate Co.)—Consent.

Deviations from Certified Plans.

City.—Deviations from the plans certified by the District Surveyor, under Section 43 of the Act, so far as relates to the proposed rebuilding of the Hoop and Grapes public-house, No. 14, Widegate-street, City, and the erection of a warehouse building on the site of Nos. 2 and 3, Sandys-row (Mr. W. M. Brutton for Mr. Evans).—Consent.

The recommendation marked † is contrary to the views of the Local Authority.

METROPOLITAN ASYLUMS BOARD.—The fortnightly meeting of this Board was held on Saturday, Mr. Benson presiding. The Works Committee was authorised to obtain tenders upon a specification to be prepared by the Engineer to the Board for removing the wires from the conduits and rewiring the head office building where necessary on the surface. The tender of Messrs. Chas. P. Kinnell & Co., Ltd., of Southwark-street, was accepted in 70*l.*, for carrying out certain additional heating works at Rochester House, in accordance with the plans and specifications prepared by the Engineer to the Board.

PENNINGTON CHURCH, MANCHESTER.—A three-light window and tracery in this church has been filled with painted glass. The subject chosen is "Faith, Hope, and Charity." The bases and canopies are treated in the Early Perpendicular style, and the tracery is filled with angels in adoration. The work has been carried out by Mr. H. A. Hymers, of Chelsea.

Correspondence.

To the Editor of THE BUILDER.

COMPENSATION FOR DISTURBANCE BY BUILDING OPERATIONS.

SIR,—A Municipal Corporation proceed, by contractors, to pull down buildings acquired under parliamentary powers for street improvement in an important thoroughfare. In so doing a tenant under lease in adjoining premises has suffered considerable inconvenience and loss by interruption of his business consequent upon accumulations of old materials, dust, noise, and other disturbances, which to some extent could have been avoided had the authorities taken the requisite precautions.

The exposure of and damage to the party wall has destroyed the comfort of some of the rooms, and fear as to its safety at one time caused the occupants to vacate the premises.

If any reader would state his experience or give reference to any records or reports showing what compensation a tenant or landlord may be entitled to for such disturbance, he would oblige an old reader and, no doubt, many others who may be liable to the same kind of injury. CITIZEN.

BOOKS RECEIVED.

SCOTTISH ARCHITECTURAL DETAILS. By John W. Small, F.S.A. (Stirling; Eneas Mackay: London: Gibbings & Co.)

BACTERIAL PURIFICATION OF SEWAGE. By Sidney Barwise. (Crosby Lockwood & Son.)

MODELLING: A GUIDE FOR TEACHERS AND STUDENTS. By E. Lanteri. (Chapman & Hall.)

ELEMENTARY PRACTICAL HYGIENE. By W. S Furneaux. Section I. (Longmans, Green, & Co.)

THE CHEMISTRY OF PAINTS AND PAINTING. By A. H. Church, F.R.S (Seeley & Co.)

THE PRACTICAL ENGINEER POCKET-BOOK FOR 1902. (Manchester: Technical Publishing Co.)

THE PRACTICAL ENGINEER ELECTRICAL POCKET-BOOK FOR 1902. (Manchester: Technical Publishing Co.)

PERSPECTIVE FOR ART STUDENTS. By Richard G. Hatton. (Chapman & Hall.)

BOOKBINDING AND THE CARE OF BOOKS. By Douglas Cockerell. (John Hogg.)

The Student's Column.

GAS AND GAS FITTINGS.

19.—OFFICIAL GAS EXAMINERS AND THEIR WORK. HOW GAS IS TESTED FOR ILLUMINATING POWER AND PURITY.

OFFICIAL GAS EXAMINERS.—Competition in the supply of illuminating gas is no longer permitted in any part of the United Kingdom because the nuisance created by the incessant tearing up of the public roads by rival companies was found to be intolerable. The operations of one gas company in each district in addition to those of the water company, the electricity supply company, the telegraph authorities, the tramway and railway engineers, and the road repairers, already cause too frequent disorganisation of the traffic in many of the main thoroughfares. The country is therefore divided into districts, each of which is served with illuminating gas by only one company or local authority. Quite recently power has been given to the Mond Gas Co. to distribute cheap low grade gas for heating and power purposes in certain Staffordshire districts already supplied with illuminating gas, but this is a departure from the policy adopted by Parliament during the last half century.

The operations of each gas company are conducted under powers and conditions specified in certain Acts of Parliament, each company having its own special Act or Acts relating to the laying of pipes, the opening of streets, and the standard price, illuminating power, and purity of the gas to be supplied. Many of the smaller companies are controlled by the Gas Works Clause Act of 1871, which stipulates that a place for testing the gas, and the necessary apparatus, shall be provided and maintained by the gas company, and that the official gas examiner appointed by the Local Authority shall have access to such testing place within certain specified hours. Where no such gas examiner is appointed by the Local Authority, two Justices may, upon the application of not less than five consumers, appoint a competent and impartial examiner to test the illuminating power and purity of the gas. The standard illuminating power of the gas supplied from small works in England is usually 14 or 15 candles, and the gas is required to be purified from sulphuretted hydrogen only.

In large towns a much more elaborate system of testing is commonly adopted, and a more rigorous purification of the gas is required. In London their are twenty testing stations well distributed over the area under the jurisdiction of the London County Council, in which the gas is tested every day for purity and illuminating power by examiners appointed by the Council. Within the City boundaries three additional testing stations are provided, in which the gas is similarly tested by examiners appointed by the Corporation of London. The County Council and the Corporation, moreover, each retain the services of an eminent chemist to act as superintending gas examiner and to advise on all matters relating to the public gas supply. The situation and number of the testing stations to be maintained by the gas companies, and the methods of testing to be adopted by the examiners, are prescribed by three gas referees appointed by the Board of Trade. A chief gas examiner who acts as arbitrator when a gas company appeals against the report of any of the gas examiners, and whose decision is final, is also appointed by the Board of Trade. The present chief gas examiner is Lord Rayleigh, F.R.S., and all of the gas referees are also Fellows of the Royal Society. The Act stipulates that one at least of the referees shall have "practical knowledge and experience in the manufacture and supply of gas," but owing no doubt to the able manner in which the scientific men have carried out the duties of the office no practical gas engineer has been appointed as a referee for many years.

At present the Acts of Parliament which control the operations of the metropolitan gas companies regulate only the pressure, the illuminating power, and the purity of the gas from sulphuretted hydrogen, other sulphur compounds, and ammonia; but in view of the increasing use of materials other than coal for the manufacture of gas, it appears probable that Parliament will presently be requested by the Local authorities, on behalf of the consumers, to fix a minimum standard for heating power, and a maximum standard for the proportion of carbon monoxide, and that the gas examiners will be called upon to include determinations of these in their daily tests. Already a Home Office Committee has recommended that wherever water-gas is mixed with coal-gas for public supply, a limit for carbon monoxide be fixed, and the London County Council has granted a sum of money for the purpose of making a series of estimations of the proportion of this poisonous constituent in the gas supplied in different parts of the metropolis.

In the Mond Gas Company's Act of 1901, which relates only to gas for heating and power purposes, standards have been fixed for heating value and for carbon monoxide, and provision has been made for the gas supplied to be tested by gas examiners appointed by the Local Authorities.

Illuminating Power.—It is beyond the scope of the present series of articles to discuss in detail the various methods of measuring the intensity of the light emitted from gas flames and other light sources. For detailed information reference should be made to Dibdin's "Practical Photometry," or Butterfield's "Chemistry of Gas Manufacture"; but a brief general outline may be given of the official methods of testing.

The illuminating power of gas in this country is expressed in "candles," a standard candle being the light emitted by a sperm candle (six to the pound) when consuming sperm at a rate of 120 grains per hour. The intensity of the light thrown upon an object by a light-emitting surface varies inversely as the square of the distance of the object from that light-emitting surface. Thus a flame which will throw a light of 16 candle-power upon an object 1 ft. distant, will throw a light of only 4 candle-power upon an object 2 ft. distant.

The Bar Photometer.—In the old method of gas testing (fig. 49) which is still employed in many districts, the measurement of light is made by burning two standard candles (A) at one end of a graduated horizontal bar (C) while the Argand burner (B), in which the gas is tested when burning at a rate of 5 cubic feet per hour, is fitted at the opposite end of the bar. The distance between the centre of the gas flame and the candle flames is exactly 60 in., and plumb lines are fitted at each end of the bar to enable the photometrist to see that the flames are vertical and the correct distance apart. A greased paper disc, having a circular spot in the centre which is left ungreased, is fitted in the disc-holder (D), which is mounted on wheels and can be moved along the bar either towards the gas flame or towards the candles. The greased and ungreased portions of the disc have a different degree of translucency, and if the light thrown upon one side of the disc is more powerful than that thrown upon the opposite side, one side of the disc is at once seen to be illuminated to a greater or less degree than the other side. When the gas is being tested the disc is moved towards the candles or towards the gas flame until the disc is seen to be equally illuminated upon both sides, and it is then known that the disc is receiving an equal amount of light from the two candles as from the gas flame.

Attached to the disc-holder is a pointer which moves in front of the graduated scale on the bar as the disc is moved, and as the bar is graduated to indicate candles (thus obviating the necessity of measuring the relative distances of the gas flame and the candles from the disc) the candle-power of the gas flame may be obtained by observing the figure on the scale indicated by the pointer, and multiplying this figure by two, because two candles are used as the source of comparison. Thus, if the pointer be opposite the figure 8 when the disc is equally illuminated on both sides the illuminating power of the gas flame is 16 candles; or if opposite the figure 7, the illuminating power is 14 candles. As a standard candle is defined as a sperm candle burning sperm at a rate of 120 grains per hour, it is always necessary to ascertain the rate of sperm consumption during each test. This determination is made by employing a balance as the candle-holder (fig. 49), and by means of the standard stop-clock (F) observing the time taken by the two candles to lose exactly 40 gr. in weight. The time should be exactly ten minutes, and when the rate of sperm consumption is above or below the specified amount a correction must be made by calculation. The balance-governor (G) is provided to prevent any fluctuations in the rate of gas consumption during the test, and the King's gauge (H) is a sensitive pressure-gauge, which can be used to ascertain the pressure of the gas as it issues from the burner, or at the inlet or outlet of the meter. As the volume of gas varies with the temperature and pressure under which it is measured, it is usual to correct the volume of gas recorded by the meter to the standard temperature of 60 deg. Fahr. and standard pressure of 30 in. of mercury.

The Table Photometer.—Within the last five years the bar photometers at the London testing stations have been replaced by table photometers. In the table photometer devised and prescribed for use in the official testing stations by the Gas Referees candles have been replaced as a standard of light by A. G. Vernon Harcourt's Pentane Lamp (fig. 50).

Pentane is a highly-inflammable liquid obtained by distillation from American petroleum. The saturator (A) of the lamp is partly filled with liquid pentane, and is connected by indiarubber tube to the burner (B). When allowed free contact with air pentane rapidly vaporises, but the mixture of air and vapour being heavier than air, it sinks by its own gravity down the rubber tube and can be ignited at the burner. The rate of flow, and consequently the height of the flame, can be regulated by the cock S_2, or by checking the ingress of air by the cock S_1, or by lowering the damper (D).

The height of the flame is adjusted so that its tip is about half-way between the bottom of a mica window and a cross-bar provided at the back of the lamp. The metal chimney (C) is fixed at such a height above the steatite burner that it leaves a portion of the flame exposed, which emits a light of exactly ten candle-power. The portion of the flame not concealed by the metal chimney is partly surrounded by the metal shield (E), which does not, however, cut off any of the light from the exposed flame, which is thrown towards the photoped.

The table photometer used in the London testing-stations is shown in plan in fig. 51. Instead of burning the gas to be tested at a rate of 5 cubic ft. per hour, the flame of the Argand burner is adjusted until it emits a light of exactly sixteen candles; the rate of gas consumption required to obtain this intensity of

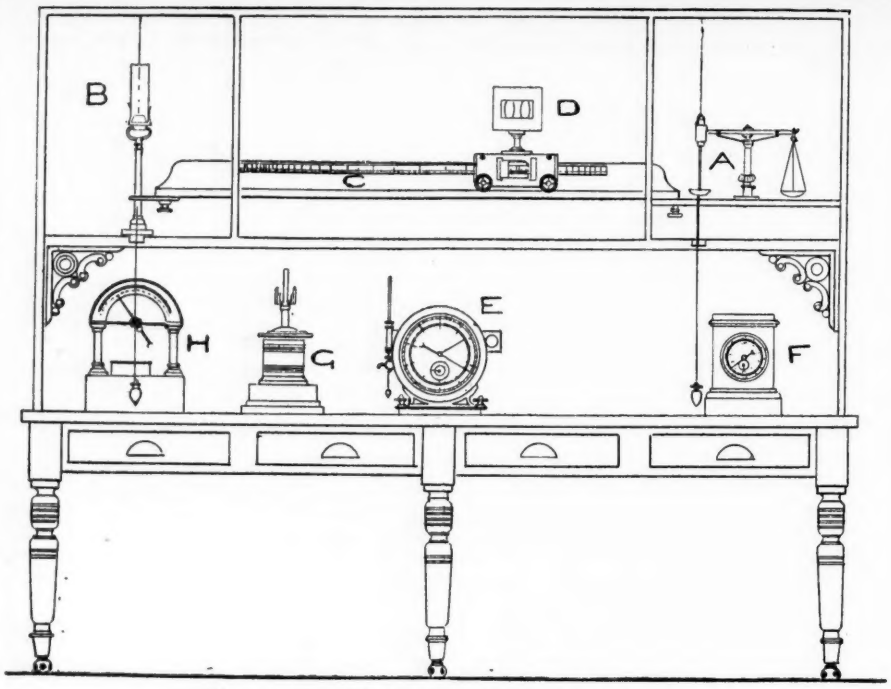


Fig. 49.—Bar Photometer with Standard Candles.

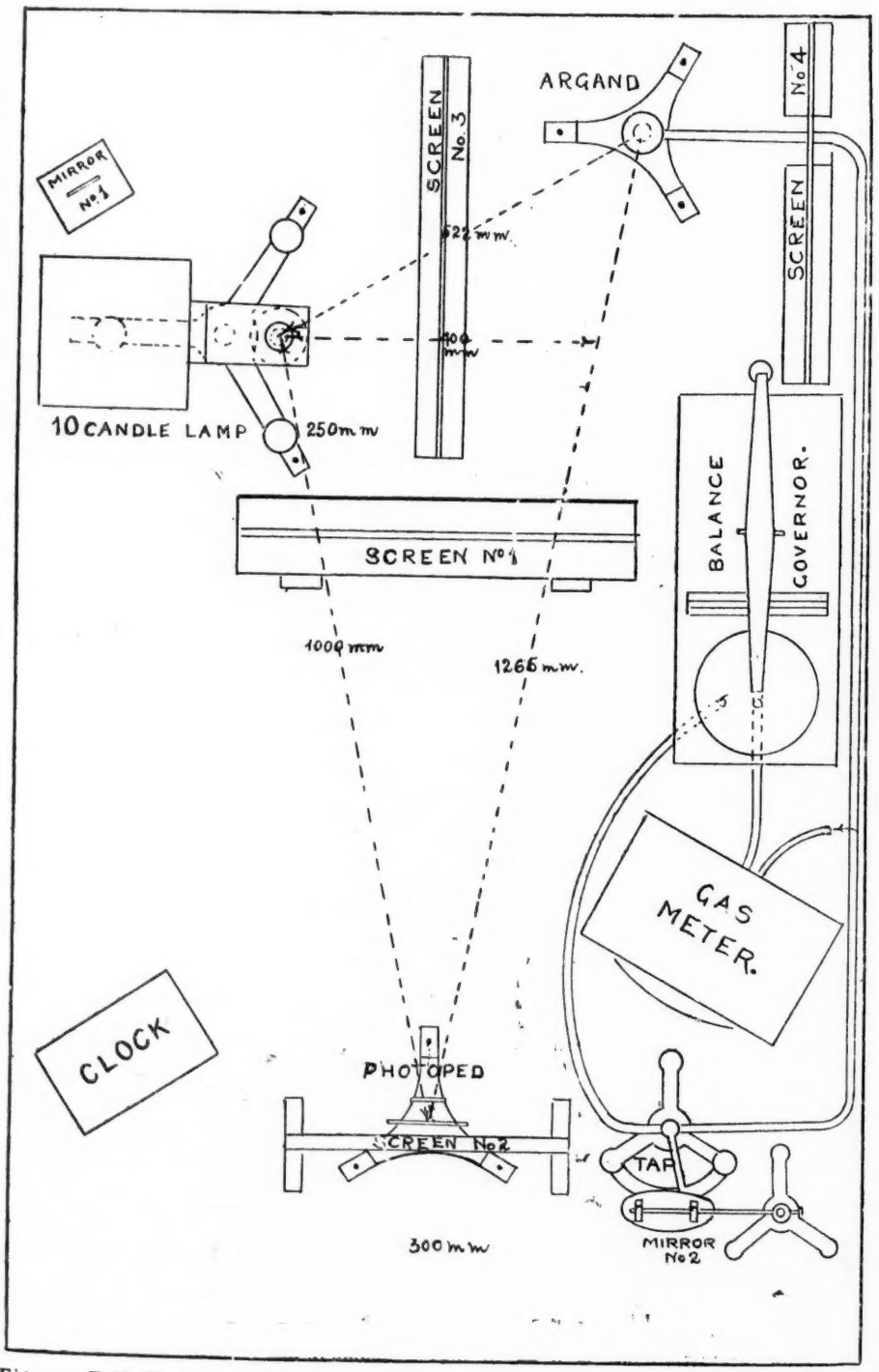


Fig. 51.—Table Photometer with Pentane Standard Lamp as Used in London Testing Stations.

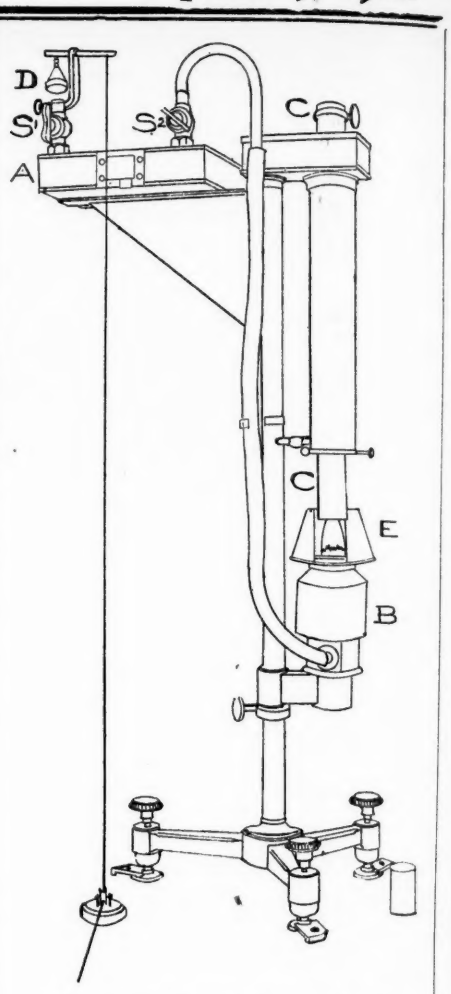


Fig. 50.—10-Candle Pentane Lamp.

light is then recorded, and a calculation is made to ascertain the proportional intensity of light which would be obtained with a rate of consumption of exactly 5 cubic ft. per hour.

Instead of a greased disc being used to ascertain when the intensity of the light thrown by the gas flame and by the pentane flame upon a given spot is identical, a piece of white unglazed paper clamped in the photoped is used, and the gas flame is adjusted until the photoped paper is seen to be uniformly illuminated. The distances of the 10 c.-p. lamp and the gas flame are so fixed that when the gas flame has an illuminating power of sixteen candles the intensity of the light thrown upon the photoped from the two sources shall be equal.

The photometer is used in a dark room, and suitable black screens are provided to prevent extraneous light interfering with the light thrown upon the photoped. Screen No. 1 (fig. 51) has orifices which allow the light from the burners to pass to the photoped without interference. The mirrors are provided merely to facilitate adjustment of the pentane flame and to throw light upon the gas-regulating tap.

Pressure.—The pressure under which the gas is supplied is ascertained by means of a water-gauge. From time to time tests are made in the street lanterns by the gas examiners, the burner and governor being removed and the pressure-gauge screwed in its place. One-tenth of an inch is deducted from the observed pressure in order to allow for the difference in height between the gas lamp and the gas main. The minimum pressure permitted in London between midnight and sunset is equal to a column of six-tenths of an inch of water, and between sunset and midnight to a 1-in. column of water.

Sulphuretted Hydrogen.—The gas is required to be completely purified from sulphuretted hydrogen, the company being liable to a heavy penalty for every day on which this impurity is detected in the gas distributed to consumers. The test for sulphuretted hydrogen consists in allowing 10 cubic ft. of gas to flow at a rate of about 0·6 cubic ft. per hour through an apparatus in which are suspended slips of white bibulous paper impregnated with acetate of lead. The presence of even a minute proportion of sulphuretted hydrogen in the gas causes a brown or black stain to appear on each of the slips

Sulphur Compounds other than Sulphuretted Hydrogen.—In London the gas must not contain more than 17 gr. of sulphur per 100 cubic feet of gas between April 1 and September 30 in each year, nor more than 22 gr. in other months. To estimate the quantity of sulphur 10 cubic ft. of the gas to be tested are burned in a small Bunsen burner at a slow rate in an atmosphere impregnated with ammonia evolved from lumps of ammonium sesqui-carbonate. The products of combustion are led into a condensing-cylinder where the water vapour produced by combustion of the hydrogen and hydrocarbons in the gas is condensed, and the condensed water holds the sulphur compounds, which are oxidised during combustion, and which enter into combination with the ammonia, in solution. When 10 cubic ft. of gas have been consumed the gas is automatically shut off, and the quantity of sulphur in the condensed liquid is subsequently estimated by chemical analysis.

Ammonia.—The proportion of ammonia in the gas must not, in London, exceed 4 gr. per 100 cubic ft. of gas. The quantity of ammonia present is found by allowing 10 cubic ft. of the gas to pass at a slow rate through a glass cylinder containing glass beads, moistened with 50 septems of dilute sulphuric acid of a known strength. The acid combines with the ammonia present in the gas to form sulphate of ammonia, and by estimating the quantity of uncombined acid remaining in the cylinder after 10 cubic ft. of gas have passed through it, the quantity of acid neutralised by the ammonia, and consequently the quantity of ammonia present in the gas, is obtained.

More detailed information relating to the chemical examination of gas cannot be given in these columns, but the "Notification of the Gas Referees," containing the official instructions given to the London gas examiners with regard to the tests for illuminating power, purity, and pressure, may be obtained from Messrs. Eyre & Spottiswoode.

GENERAL BUILDING NEWS.

NEW CHAPEL AT BLAIRS COLLEGE, ABERDEEN.—The new chapel at St. Mary's College, Blairs, which forms a section of the scheme of building extension which has been in progress there for several years, was opened on the 23rd ult. The chapel is not yet absolutely finished as a building, an addition yet to be made being a spire, the erection of which is to be proceeded with at once. The chapel is the gift of Mgr. James Lennon, Liverpool, and when completed will have cost close upon 12,000*l.* It is the design of Mr. Robert Curran, architect, Warrington, and is in the style of the middle period of Gothic architecture. Several features meet the eye of the worshipper inside the chapel; for instance, the richly-carved oak and pitch-pine woodwork, the stained-glass windows in the western gable behind the altar, and the altar. The altar, the work of Messrs. Pearse & Sons, Dublin, is specially worthy of notice. The front is of white Carrara marble, the outstanding feature of the main centre panel being a representation in high relief of Leonardo da Vinci's conception of "The Last Supper." The panels in the octagonal wall behind the altar will in course of time be filled in by a reredos. A set of Stations of the Cross in oaken frames—fourteen pieces in all—is the work of Messrs. Mayers & Co., of Munich and London.

STEEPLE, FOOT'S CRAY CHURCH, KENT.—A new steeple has just been added to the parish church of Foot's Cray, Kent. The work of construction was entrusted to Messrs. Stebbings & Pannett, of Foot's Cray and Sidcup, and they have carried out the designs of Mr. Boucher, of the firm of Drake & Boucher, architects, Rochester. Advantage was also taken of the occasion to have the peal of five bells retuned by Messrs. Gillett & Johnson, of Croydon, and rehung in the steeple.

EMMANUEL CHURCH, NOTTINGHAM.—The completion of Emmanuel Church, Woodborough-road, Nottingham, was commemorated on the 24th ult., when the new baptistry, clergy and choir vestries, which for some time past have been under construction, were dedicated. The additions are at the west end of the church, extending up to the western boundary of the site, and consist of a baptistry, 18 ft. by 23 ft.; a choir vestry, 15 ft. by 27 ft.; and a clergy vestry, 12 ft. by 13 ft. The baptistry gives accommodation for thirty-eight additional seats. The interior walls of this part and of the entrances are faced with red Bulwell bricks, with blue brick in patterns to correspond with the rest of the church interior. The dado consists of the evangelistic symbols and heads of the great apostles to the Jews and to the Gentiles, carried out in glass mosaic, arranged in panels. This dado has also been carried throughout the aisles and transepts of the church. The ornamental stencil work of the baptistry ceiling has not yet been completed, but the exterior is carried out in a similar manner to the rest of the church, Coxbench rock-faced stone being used for the walling, and Hollington stone for most of the facings. The roof and position of the baptistry are emphasised on the exterior by a metal cresting and foliated cross. Red tiles are used for roofing. The porch has timber gable work, and when completed will have two sculptured figures of apostles, one on each side, in niches. The works have been carried out from the designs and under the superintendence of Mr. Watson Fothergill by Messrs. Williamson & Co.—*Nottingham Guardian.*

ST. COLUMBA CHURCH, GLASGOW.—St. Columba Church, plans for which have just passed the Dean of Guild Court, is of considerable interest to the Highland community of Glasgow as being the only church in the city in connexion with the Church of Scotland in which the services are held in Gaelic. The new church is composed of nave and transepts, and accommodates close upon 1,100 sitters. There are galleries in the transepts, and a gallery at the end of the nave. The other accommodation includes a hall to accommodate 350, a smaller hall for 120, session-house, vestry, choir vestry, ladies' room, and kitchen. A church officer's house is also provided. The organ is divided, and placed in arched chambers on each side of the chancel, while the pulpit is placed on the one side of the nave, outside the chancel. A spire, rising to a height of 200 ft., forms a conspicuous feature, the spire having pinnacles and belfry stage for bell, and with niche and canopy in which is placed a statue of the patron saint, St. Columba. The architects are Messrs. William Tennant and Fred V. Burke, and the building will cost about 15,000*l.*

CHURCH, CLEVELAND, YORKSHIRE.—On the 30th ult. the Right Rev. F. R. Blunt, D.D., Bishop of Hull, consecrated a new church at Carlin How, in the parish of Brotton-in-Cleveland. The church, which contains seating accommodation for 340 worshippers, has cost between 2,200*l.* and 2,300*l.* The contract was carried out by Messrs. Cruddas & Sons, Guisborough. The church, which has been built from designs supplied by Messrs. Hicks & Charlewood, architects, Newcastle, is of red bricks, with terra-cotta facings. It has a single aisle running from the main entrance to the chancel, and is flanked on either side by bays, the arches leading to the transepts being supported on brick pillars. An organ-chamber and vestry have been constructed on the north side of the chancel.

CHURCH OF ALL HALLOWS, EASTON, BRISTOL.—The new Church of All Hallows', Easton (in connexion with All Saints', Bristol), was consecrated recently. The scheme provides for a building capable of accommodating 800 worshippers, but this has not yet been completed, the work accomplished including choir, sanctuary, north and south transepts, chapel, and three bays of the nave and aisles. The walls are faced externally and internally with red Pennant stone, Bath stone being used for the dressings, and an open timbered roof has been provided. The chief feature of the church is the apsidal termination of east end, which has an ambulatory around it. The choir and sanctuary are large and lofty, the apparent height being increased by the lofty arcades between the choir and the transepts. There is a fine altar, but the choir stalls have not yet been executed, and the pulpit is a temporary one. The contractors for the building are Messrs. R. Wilkins & Son, and the architects are Messrs. Crisp & Oatley, of Bristol.

CENTRAL TECHNICAL SCHOOL, LIVERPOOL.—The new Central Technical School and Museum, which was recently opened by the Duke of Devonshire, was designed by Mr. E. W. Mountford, of London, and the contractors for the buildings were Messrs. Joshua Henshaw & Sons, of Liverpool. The site comprises 2,900 square yards, and the height of the elevation to Byrom-street is 84 ft. The basement, ground floor, and first floor are occupied by the offices, lecture-halls, and classrooms of the technical school. The two upper floors are museum galleries, and the effect of this extension is to enlarge the museum to three times its former size. The chemical department of the technical school is, however, placed at the top of the building in a cross gallery specially designed for the purpose. It comprises a spacious laboratory. On the top of the building also is an observatory, fitted with an equatorial telescope and transit instruments for the use of the Nautical College. The building is constructed of Darley Dale sandstone. Ancaster stone, of finer and softer quality, is used for the bases and capitals of the pillars of the interior. This stone was quarried at Grantham, Lincolnshire. The steps and landing are of fine-grained Shepley flags, obtained near Huddersfield. The main entrance from Byrom-street conducts to a vestibule and hall, paved with white and grey marble, and decorated with pillars of Devonshire marble from Torquay. The grey marble used for the panelling of the walls is from the Ashford Quarries, Derbyshire. Irish red marble, from Cork, has been used for the fireplace, above which is a sculptured panel of alabaster from Uttoxeter, the design being adapted from the armorial bearings of the Liverpool Corporation. The wood used for the lofty panels in the lecture-hall and throughout the building is Canadian whitewood. Oak has been used for the doors and panels in the hall and corridors, and pitch pine for the floorings. Messrs. Paterson & Son carried out the structural woodwork. The woodwork fittings were executed by Messrs. Brown & Backhouse. The general and fibrous plaster-work was entrusted to Messrs. J. Tanner & Son, and was carried out under the direction of Mr. Arthur Chute. In the entrance-hall and lecture-hall are reliefs by Mr. Pomeroy, of London, illustrating the development of shipbuilding and technical crafts. These were coloured by Mr. R. Anning Bell. The exterior sculptures are also by Mr. Pomeroy. Those over the main entrance represent Art holding up a mirror to Nature, and Science, veiled, holding a crucible. The groups in the pediments facing William Brown-street represent respectively Minerva (typifying the wisdom of the city) presiding over the education of the community, and Liverpool (a figure holding a globe and sceptre), supported by figures typical of its commerce and industries. Sculptured figures on the pediments of the arches represent Astronomy, Navigation, Geography, and Agriculture. The wrought-iron gates at the front entrance are by Messrs. Singers, of Frome; those at the entrance to the area in William Brown-street by the Bromsgrove Guild of Arts and Crafts; the iron railings and gates in Clayton-street by Worrall, of Liverpool; and those in the archways leading to the interior courtyard by Messrs. Ramsden & Carr, of Battersea. The standards for the electric lamps on the balustrade at the Byrom-street entrance were modelled by Mr. Pomeroy, and cast in bronze by Messrs. Singers. The electroliers in the entrance-hall, as well as the firegrates in wrought-iron and brass in the vestibule and committee-room, are by Mr. Nelson Dawson, of London. The heating and ventilation of the building has been carried out on the Plenum system by Mr. W. Key, of Glasgow. The electric lighting and power equipment was carried out by the Corporation electric lighting department. The equipment of the mechanical and electrical engineering laboratories is by Messrs. Sloan & Lloyd Barnes. The building was illustrated in the *Builder* for August 8, 1896, and January 2, 1897.

NEW ALTARS, PARISH CHURCH, CARNDONAGH, IRELAND.—The church of the Sacred Heart, in Carndonagh, has recently been supplied with three new altars. In the high altar, which stands 5 ft. above the ground floor, the body is supported on double ebony pillars with central annulets and turned caps and bases. The centrepiece consists of three Romanesque arches, with walnut tablets of "I.H.S." inserted. The return ends of the altar have five Gothic arches, with Scotia mouldings around each. Underneath are five squares with chamfered mouldings at the bottom. On each end of the return stand two canopies, with Gothic arches, supporting a spire and having four urns, all with crocket facings, with the central one carved on top. At each side of the small canopy is a double reredos with four large buttresses of polished oak and six ebonised pillars between three Gothic arches, having carved crockets on top. In the centre is a tabernacle, with brass safe, having two ebonised columns in front, on which stands a canopy supported by four similar pillars of the same material, with polished carved annulets and caps. The top ends in an octagon spire supporting a large carved cross, with medallion under. The central canopy is 15 ft. high and extends to the ceiling. The body part of the altar of the Virgin is supported on four ebonised pillars, with caps, annulets, and bases of carved and polished oak. The central panel on this altar is composed of double-moulded quatrefoil, with carvings on walnut ground. The Sacred Heart altar is of polished oak, with ebonised pillars, caps, annulets, bases, &c., on which is a carved panel of the Heart. A statue stands on each of these two altars. On all the altars are carved brackets of polished oak, supported by ornamental caps for vases and small statues. A statue of carved wood also stands on each side of the high altar. The Communion rail round the altars has a length of 60 ft., and is formed of polished Romanesque arches, with moulded abaci, supported by turned caps, annulets, and bases of ebonised pillars, with chamfered bottoms, the rail being carved the whole way through. Over the arches are mouldings of ebony balls. The top is a 6-in. walnut capping, finely polished. The painting and panelling were carried out by Mr. M'Closkey, of Londonderry. The altars were designed, executed, and erected by Mr. C. Bull, of Dublin, who was assisted in the work of erection by Mr. M. Doherty, of Carndonagh.

THEATRE, STOCKBRIDGE, EDINBURGH.—The new theatre situated in St. Stephen's-street, Stockbridge, is practically finished, and will shortly be opened. Nearly the whole accommodation is on the ground flat, there being only one end gallery. The auditorium measures about 90 ft. by 76 ft., covered by one arched steel roof, and the floor space is subdivided into three divisions, pit, pit-stalls, and orchestra-stalls, with promenades and boxes at each side. The stage, which measures about 55 ft. by 45 ft., has a proscenium opening 30 ft. in width, with the usual flies and grid constructed overhead. There are four entrances, and the building can be emptied of its audience in one and a half to two minutes. There is a large entrance hall measuring about 70 ft. by 25 ft., a number of dressing-rooms for actors and actresses, ladies' retiring-room, and other conveniences. It is lighted by electricity,

with gas in reserve, and is ventilated by la g[e] electrically-driven fans. The architect is Mr. P Marwick, of Edinburgh.

FOREIGN.

FRANCE.—A new post office is to be built at La Rochelle at a cost of 253,000 francs.——A committee has been formed for the erection at Dijon of a monument to Bossuet in some public situation (not yet decided on) in the town. M. Maturin-Moreau and M. Paul Gasq are to be the designers.——An important monument has been erected at Chartres, and was inaugurated on Sunday the 31st ult., to the memory of the soldiers of the Department of the Eure-et-Loire who fell in the Franco-German war. The monument, which stands at the entry to the Promenade des Charbonniers, consists of a triumphal arch between two pylons and crowned by a *fronton* decorated with the armorial bearings of Chartres, Châteaudun, Dreux, and Nogent-le-Rotrou. Beneath the arch is a figure personifying the Republic, and waving a flag. On each side of the arch are two statues, an artillery-man on the right, a mobile on the left; in front of the arch is a circular basin supplied from two lion's heads sculptured on the pylons. The general design is the work of M. Néuot, and the sculptors are MM. Henri Allouard, Loiseau-Bailly, and Boverie.——M. Chabas, the painter, has just completed the most important part of the decoration of the Mairie of Vincennes, which is still to be completed by two military subjects originally commissioned from M. Dupray, but now to be carried out by M. Arus.——The Municipal Council of Paris is occupied with the arrangement of the Victor Hugo Museum, which will occupy the house at 6, Place des Vosges, formerly inhabited by the poet. On the first floor will be placed pictures and engravings inspired by or relating to the works of Victor Hugo. On the second floor will be drawings, and also furniture, made by the poet himself; and on the third floor is to be a restoration of the room in which he died at Avenue d'Eylau.——A tapestry, after a cartoon by M. E. Toudouze, has just been placed in the Palais de Justice at Rennes. It is about 20 ft. square, and represents the marriage of Anne of Brittany to Charles VIII., at the Château de Langeais, in 1491.——A monument to Duguesclin, by M. Frémiet, is shortly to be unveiled at Dinan. It consists of an equestrian statue.——The Municipal Council of Rennes has voted a sum of 300,000 fr. for a new museum of painting, the design for which will be the subject of a public competition.——An international art exhibition is to be held at Nice, from January 10 to the end of March next year.——Mme. Gounod, the widow of the composer, has presented to the town of Marseilles the bust of the eminent composer executed by Carpeaux, which will be placed in the principal theatre.——The death is announced, at the age of sixty-six, of M. Dulac, architect, a former member of the Association Provinciale des Architectes.——The death is also announced, at the age of fifty-one, of M. Henri Degrève, architect, and member of the Société Centrale. He was a pupil of Achille Hué, and gained the first premium in the competition for the Hôtel de Ville of Meulan. He had exhibited at the last Salon a remarkable design for a house to be built at Margival.

AUSTRALASIA.—The council of the Royal Victorian Institute of Architects has decided that the age at which a candidate may submit himself for examination to qualify as an associate shall be changed from twenty-one to twenty years of age.——The death of Mr. R. Gordon Hyndman, a well-known Melbourne architect, is announced.——A new church erected at Cowwarr, Victoria, has recently been completed and opened.——The Crown Law offices in Sydney are about to be considerably enlarged, and the plans for the additions have already been adopted.——The Government has decided to carry out a number of improvements at Garden Island, Sydney Harbour, including buildings and harbour accommodation generally.——Competitive designs are about to be invited for a building to house the lending-library branch of the free library, now installed in the Victoria Markets, Sydney.

MISCELLANEOUS.

PROFESSIONAL AND BUSINESS ANNOUNCEMENTS.—Mr. R. E. W. Berrington, civil engineer, of London and Wolverhampton, announces that his son, Mr. Ernest Berrington, has taken up residence in London as the manager of their London office at 28, Victoria-street, S.W.

COMMONS AND FOOTPATHS PRESERVATION SOCIETY.—A meeting of the Executive Committee of the Commons and Footpaths Preservation Society was held on Thursday, the 31st ult., at 1, Great College-street, Westminster, under the presidency of the Right Hon. G. Shaw-Lefevre. It was reported that eminent legal advice had been obtained by the Society as to the recent enclosure of Stonehenge. It appeared that several clearly defined tracks leading to the monument had been obstructed by the erection of a barbed-wire fence, and the Society was advised that *primâ facie* there was a strong case for the existence of public rights of way over these tracks. The Committee resolved to petition the Local Authorities to protect the public rights involved, and letters from eminent archæologists were read protesting against the enclosure of Stonehenge on the ground that the character of the monument had been entirely altered by the existence of a high barbed-wire fence in close proximity to the remains. It was further pointed out that the stones could be amply protected from injury, without enclosure, by means of the Ancient Monument Protection Acts. The solicitor stated that the obstruction to the footpath leading from Sewardstone to Epping Forest had now been removed by the Waltham Holy Cross Urban District Council at the instance of the Society. A mass of evidence has been obtained by the Committee and laid before Mr. Rawlinson, K.C., whose opinion was strongly in favour of the existence of a public path. As a result, the District Council had held a local inquiry and had resolved to cut the barbed-wire fence forming the obstruction. Much gratification was expressed at the action of the District Council, which has secured the preservation of one of the most beautiful means of access to Epping Forest. A further grant of 10*l.* was made by the Committee to the expenses of an action to secure the preservation of a path at Wadborough, Worcester, and grants were confirmed with respect to commons cases at Lodsworth, Leagrave, and Okehampton. It was reported that counsel's opinion had now been received with reference to the quarrying away of cliff footpaths in the Isle of Portland. The Society were advised that the custom was illegal, and it was determined in the first instance to request the District Council to take immediate steps for the protection of the paths, some of which are rapidly disappearing. The secretary's General Report embraced particulars of nearly 150 cases with which the Society is dealing at the present time. These included disputes respecting footpaths, commons, village greens, and roadside waste in thirty-five counties.

ARBITRATION CASE.—The award has been made in the arbitration proceedings of July and August last, between Messrs. A. Krauss & Son and the Corporation of Bristol, over the enlargement of the lunatic asylum. Messrs. Krauss & Son claimed 4,734*l.* on account of loss of profits, increased cost of labour, supervision and establishment charges, depreciation of plant, and loss of interest on capital, through alleged delay of the Corporation in delivering certain materials for the work. Mr. H. R. Withycombe, the arbitrator named in the contract, heard evidence for several days. Mr. James Inskip appeared for the claimants, and Mr. B. R. Vachell (instructed by Mr. W. H. Wise) for the respondents. The award is that the Corporation shall pay 120*l.*, and as that is less than the amount which they offered before arbitration, the claimants are to pay cost of the reference and the arbitration. The contract price was 36,927*l.*—*Bristol Times.*

REREDOS, ST. MARY'S, LEIGH WOODS, BRISTOL.—The reredos at St. Mary's Church, Leigh Woods, to the memory of the late Mr. John Harvey, of Leigh Woods, has just been dedicated. The reredos is of alabaster and gilt, with oak super-altar, and near the latter is to be inscribed a plate bearing the inscription. In the reredos there are nine panels, carved, each containing a sacred monogram or emblem of the Passion. The super-altar and panelling on each side of the altar are of fumigated oak. The architect is Mr. G. F. Bodley, A.R.A., and the sculptors were Messrs. Flint Brothers, of London; the church decorators and gilders employed on the work being Messrs. W. O. and C. Powell, of London.

GLASGOW BUILDING TRADES' EXCHANGE.—The annual meeting of the Building Trades' Exchange of the City and District of Glasgow, Ltd., was held on the 29th ult. in the Exchange, Gordon-street, Colonel Bennett presiding. The secretary (Mr. David Cook, writer) submitted the eighth annual report. It stated that the treasurer's accounts showed an income of 701*l.* 7s. 9d., and an expenditure of 666*l.* 10s. 5d. A further sum, however, had been earned, so that the total credit balance on the year should be 44*l.* 17s. 4d. Of this balance the executive had devoted 3*l.* to depreciation of furniture, and written 10*l.* off the preliminary expenditure in connexion with the formation of the Exchange, leaving a balance of 31*l.* 17s. 4d. to be carried to profit and loss account. The executive recommended a dividend of 4 per cent. on paid-up capital. During the year there had not been any work of particular moment to which the Exchange could devote its energies, with the exception of the scheme for the extension of the Glasgow and West of Scotland Technical College. Exchange members had contributed towards that scheme 2,053*l.*, and there was a possibility that this sum might be considerably augmented. On the motion of the Chairman, seconded by Mr. Donald, the report was adopted. The vacancies on the Council were afterwards filled up, and Messrs. Paterson & Benzie, C.A., were reappointed auditors.

CAPITAL AND LABOUR.

THE BUILDING TRADE.—The decline in the building trade of the country generally, which is attributed to the effect of the war and the continued high price of materials and labour, has caused several associations connected with the National Federation of Building Trade Employers to give notices to the workmen for reductions of wages. At Birmingham the trade-union representatives of the carpenters and joiners, masons, bricklayers, plasterers, and labourers have each been notified of a reduction in wages, to come into operation next year.

LEGAL.

THE WEST-END BUILDING DISPUTE.

THE case of Bailey *v.* Lewis was again mentioned to Mr. Cozens-Hardy in the Chancery Division on the 1st inst., in which Mr. Lewis, the draper, had been committed for contempt of Court in not complying with an order of the Court to remove certain buildings in Hollis-street, Cavendish-square, in breach of a covenant with the ground landlord, the trustee of the Portland Estate. The case was reported in last week's issue of the *Builder*.

Mr. Eve, K.C., now put in an affidavit made by the defendant, expressing his regret for what had taken place, and adding that his reason for not complying at once with the order of the Court was that he was in the hope and expectation that satisfactory terms would be arranged which would avoid the necessity of carrying out the order. The learned counsel added that the plaintiff was willing to accept an undertaking from the defendant to put in plans and specifications which would possibly render the carrying out of the order needless.

Mr. Vernon Smith, K.C., on behalf of the plaintiff, agreed to this.

His Lordship, in accepting the apology in the terms of the affidavit, and ordering the plans to be lodged within a fortnight, again remarked that the defendant had committed an act of gross disobedience to the order of the Court.

THE LONDON BUILDING ACT, 1894:

TRIBUNAL OF APPEAL CASE.

THE Tribunal of Appeal have made an Order in the Appeal made by Mr. C. W. Matthews, and heard on the 25th ult., against the certificate of the Superintending Architect of Metropolitan Buildings, dated September 17 last, under Sections 22 and 29 of the Act, defining the general line of buildings on the western side of West Hill, Highgate, between Millfield-lane and Parliament Hill Fields, in which street he further certifies the building in question to be situate. The Tribunal allow the appeal, and decide and determine that the general line of buildings on the western side of West Hill, Highgate, between Millfield-lane and the south-eastern corner of No. 1, West Hill, is as defined on the plan annexed to their Order by a strong green line; and further, they make no order as to costs.

CASE UNDER THE 1894 BUILDING ACT.

AT Marylebone Police-court recently, Alfred Bush, builder, of 6D, Ridgmont-street, Gower-street, appeared to a summons, issued at the instance of Mr. Arthur Ashbridge, District Surveyor for Marylebone, for making, in the erection of a building at the corner of Paradise-street and Ashland-place, Marylebone, default to comply with a notice of irregularity under the Building Act. Mr. D. P. Andrews supported the summons on behalf of the London County Council, and Mr. W. Moyses, barrister, defended, representing the Portland Industrial Dwellings Company, the owners of the building in question. Mr. Andrews said that the building was a large one, and was intended for the occupation of persons of the industrial classes. It was agreed on both sides that, the building being over 125,000 cubical feet in extent, Section 68 of the London Building Act applied. It was provided by that section that in every public building, and in every other building of more than 125,000 ft. of cubical extent, which was constructed or adapted to be used as dwelling-houses for separate families, the floors of the lobbies, corridors, landings, and flights of stairs should be of fire-resisting material and carried by supports of a similar material. But it was also contended by the complainants that the building, being over twenty-five squares, or, in other words, covering more than 2,500 superficial feet, should conform with Section 74, Sub-section 3, which required that all the floors of the rooms, as well as those of the lobbies, &c., should be fireproof. Apart from that matter no exception was taken to the building. In all probability a paraffin lamp would be used in every one of the rooms in this building at night, and it was therefore of the highest importance that the floors should be fire-resisting. Mr. Moyses urged that Section 74, Sub-section 3, only aimed at large buildings like flats, containing three or four rooms, intended to be occupied by different persons, and with an outer door. The object of the company he represented was to solve the most acute problem of finding dwellings for the industrial classes in congested districts. Every one of the rooms in the building in question might be let off separately; at any rate, a weekly rent would be charged per room. They therefore thought it was oppressive and unreasonable to try and compel them to incur the great expense of making the floors of even the smallest rooms fireproof. As to the possibility of fire, he pointed out that in all probability gas, and

not lamps, would be used by the tenants. Mr. Plowden, in deciding the case, said that the whole question seemed to be what was a fair meaning to be placed on the words of the Act that in every building "containing separate sets of chambers, offices, or rooms" there should be fireproof floors. In his opinion "separate sets" had nothing whatever to do with offices or rooms, but referred simply to chambers. Every kind of room, office, or set of chambers which was inhabited at all should therefore have fireproof floors. Consequently he held that this building contained sets of chambers or rooms, or, even if not sets, they contained rooms which required fireproof floors. His order would be that the defendant should comply with both Section 74, Sub-Section 3, and Section 68 of the Act, and pay 5*l.* 5s. costs.

THE ARCHITECT AS ARBITRATOR.

On the 4th inst., before the Court of Appeal (composed of the Master of the Rolls and Lords Justices Stirling and Mathew), the case of W. Belcher and another (trustee, &c.) *v.* The Roedean School Site and Buildings, Ltd., and another, was heard, on the appeal of the Roedean School Site and Buildings, Ltd., and of Mr. J. W. Simpson, an architect, from orders of Mr. Justice Lawrance in Chambers, dated August 8, 1901.

Mr. Ralph Neville, K.C, and Mr. Leigh Clare appeared as counsel for the appellants; and Mr. Reginald Bray, K.C., and Mr. Hudson for the respondents.

Mr. Neville said that the Roedean School Site and Buildings, Ltd., was a company established for the purpose of erecting the buildings of a well-known school at Brighton, and the respondents on the appeal were a gentleman named Belcher and also a Mr. Davis, the trustee in the bankruptcy of the contractors, Messrs. Peters, Peter, & Son, who had contracted to do some of the brickwork in the erection of the schools. The appeal was from a decision of Mr. Justice Lawrance, revoking the submission to the architect in the builder's contract. The learned Judge revoked the submission altogether, and as he (counsel) understood the ground of the learned Judge's decision, it was, to put it shortly, based on the fact that there was litigation pending between Mr. Belcher and the architect, and that the case came within the meaning of the decision of a Divisional Court in "Baring Brothers *v.* Doulton & Co.," that litigation pending between the architect and a party to the contract was sufficient ground for the revocation of the submission. In that case, however, the litigation which was pending was commenced by the architect himself against one of the parties to the contract; in the present case the litigation was commenced by one of the parties against the architect with the express view, as he (counsel) submitted, of putting an end to his acting as arbitrator under the contract.

Mr. Bray remarked that such a thing was never suggested to Mr. Justice Lawrance.

Mr. Neville: Well, I will only say this, that if this gentleman is successful in determining the submission to the architect by the proceedings he has instituted, there is a sure and simple method open to all parties in cases of this kind if they do not wish the arbitration to go on in the usual way. The learned counsel went on to state that the contract between the company and the contractors, Messrs. Peters, Peter, & Son, was entered into on February 25, 1897, the contract price being 43,589*l.* Mr. J. W. Simpson was the architect named in the contract. There was very little of the contract that he need call attention to. Clause 4 provided that the work should be completed to the satisfaction of the architect on or before September 1, 1898, with penalties of 10*l.* a day for delay. Clause 16 provided for the payment of the contract price by instalments upon the architect's certificates, 8 per cent. being payable until 4,500*l.* was in reserve, and after that for full payments on the certificates. Clause 20 made provision for the determination of the contract in certain circumstances, one of which was the bankruptcy of the contractors. Another clause gave the building owners power to determine the contract in case the work was not proceeded with to the satisfaction of the architect. Clause 26 was the arbitration clause, which provided that in the event of any dispute arising between the Company and the builders, they should be referred to the architect, whose decision should be conclusive and binding upon both the parties. When September 1, 1898, arrived, the buildings were very far from completion. It seemed that the builders were short of funds, and they obtained loans from different people on the credit of the contract.

Mr. Bray: This does not appear in any affidavit.

Mr. Neville: It appears in the accounts then.

Mr. Bray said it was quite immaterial to the case.

Mr. Neville: I do not think we can get on without mentioning that there were persons who advanced money besides Mr. Belcher. The learned counsel continuing said that Mr. Belcher advanced money to the builders and got a charge on the contract in his favour. The first notice of any charge was in September, 1898, and again in January, 1899, there was notice of a charge. On January 27, 1899, the architect gave the contractors notice to proceed under the 20th clause of the contract, and on their failure to proceed according to his satisfaction, the building owners on February 1, 1899, served notice to determine the contract under that clause. On the same day the contractors presented a petition in bankruptcy which was followed by a receiving order. Then the work was taken over in accordance with the terms of the contract by the building owners and completed under the inspection of the architect. On June 27, 1901, the architect issued his final certificate, which showed a balance due to the contractors of 350*l.* 18s. 5d. There was accompanied with it a statement of account by the company, in which they showed a claim for penalties for non-completion of the work in due time and damages for non-completion amounting to 1,256*l.* 7s. 5d. That amount was arrived at after deducting from the claim the amount due to the contractors under the final certificate of the architect, and a certain amount which had not been paid although certified for previously. Those accounts were sent to the trustee in the bankruptcy of the contractors and also to the other persons from whom notices of charges had been received. The solicitors to the trustee refused to accept the certificate issued by Mr. Simpson on the ground that the contractors had a large claim against the company for improperly determining the contract. On July 6, 1901, the solicitors to the company wrote to the architect asking him to make an appointment as arbitrator under the contract, and the architect appointed July 23 for the first sitting. The trustee refused to acquiesce in the arbitration or to submit to the jurisdiction of Mr. Simpson as arbitrator. Mr. Belcher's solicitors also wrote to Mr. Simpson on July 19, 1901, stating their surprise that the balance due to the contractors under his certificate was only 350*l.* odd, and that their client had advanced large sums of money to the contractors on the faith of assurances given to him by Mr. Simpson as to the retention fund of 4,500*l.*, and so on. Subsequently Mr. Belcher commenced an action against Mr. Simpson for damages for misrepresentation and fraud, and he (Mr. Neville) submitted that this litigation was simply started to bring the case within the decision of Baring Bros. *v.* Doulton & Co., and so put an end to the arbitration which Mr. Belcher did not like. A summons was afterwards taken out for an injunction to prevent the arbitration proceeding, and Mr. Justice Lawrance granted the injunction and revoked the submission to arbitration. The learned counsel argued that there was no ground for saying that Mr. Simpson was not a proper person to act as arbitrator under the contract, and that the action started by Mr. Belcher for which there was no justification was to bring the case within the decision of the Divisional Court before referred to. In the circumstances, he submitted that the orders of Mr. Justice Lawrance should be reversed.

Mr. Bray said that the action started by Mr. Belcher was a bonâ-fide one. Mr. Belcher was applied to by the contractors for money, and it was decided that he should provide the remainder of the money to finish the work. Mr. Belcher went with his solicitor to Mr. Simpson, and this gentleman assured him that the job was paying the contractors very well, and that he would be perfectly safe in advancing the contractors money for the rest of the job. The learned counsel said that the matter had been a most unfortunate one for Mr. Belcher, as he had advanced large sums of money to the contractors. He would be satisfied that any other qualified architect should act as arbitrator under the contract, but he submitted that Mr. Simpson, in the circumstances, was not the proper person to act as arbitrator. He suggested that as the amount said to be due to the Company was small, the arbitration should be ordered to stand over until the action against Mr. Simpson had been tried.

The Master of the Rolls in giving judgment said that in ordinary building contracts the architect was the person appointed to determine disputes between the parties. It was known that these disputes raised questions between the contractor and the architect. In many cases the architect as arbitrator had to determine when he had given say, a disputed order, whether he was right or wrong. The parties stipulated for not necessarily an unbiassed arbitrator. That being so, what materials were there in the present case to suggest that there would be any bias in the arbitrator beyond that ordinary or inevitable bias in other cases? Mr. Belcher, who was not a party to the contract at all, said that the architect had made representations to him which turned out to be so untrue that they must have been fraudulent at the time he made them. This was denied by the architect, and it was said on his behalf that there was nothing which could give any suggestion for fraud on his part. But it was said, however, that one of two parties who desired to avoid going to arbitration could, by making a most injurious charge against the arbitrator, at once oust his jurisdiction. His Lordship did not think that the Court ought to give effect to the objections given, because by opening the door to attempts to get rid of arbitration it would open the door to attempts to get rid of contracts. Mr. Bray had desired the Court to let the charge against the architect be decided by jury first and then come back to the question of arbitration. That, however, was not what the parties stipulated for. They stipulated for the determination of their disputes by a named person. He thought that the architect should be reinstated in his position as arbitrator, and that the arbitration should proceed.

The Lords Justices concurred, and the appeal was accordingly allowed with costs.

CASE UNDER THE WORKMEN'S COMPENSATION ACT, 1897.

The case of Ayres *v.* Buckeridge came before the Court of Appeal, composed of the Master of the Rolls and Lords Justices Stirling and Mathew, on the 6th inst., on the appeal of the defendant (the employer) from the decision of the County Court Judge at Brentford in an arbitration under the Workmen's Compensation Act, 1897, awarding the applicant, the widow of a labourer who sustained fatal injuries through an accident while in the course of his employment, 292*l.* 10s. compensation. It appeared that the deceased man was employed by the foreman of the defendant to assist in the demolition of a building at Ealing. At the time the man was at work in Whitechapel, and it was arranged, in order that the rate of wages should be remunerative to him, taking into account that he would have to travel to his work, that he should be employed for eleven hours a day for five days in the week and for five hours on Saturday, making altogether sixty hours a week, and that his pay should be 7½d. an hour. The employment was not for any specified time, and the man was liable to be discharged at an hour's notice. The man was at work for four days, and on the fourth day met with the accident. He worked for eleven hours on each of the four days. The County Court Judge, in calculating the award of 292*l.* 10s., did so on the basis that this was the amount which the man would have earned if he had been employed for sixty hours a week at the rate of 7½d. an hour for a period of three years. The employer appealed, and on his behalf it was contended that the amount of compensation ought to be based on the amount of wages in fact received by the deceased man during the time that he was actually employed. The period of his actual employment was forty-four hours in the first week of the employment, and wages at 7½d. an hour for forty-four hours amounted to 1*l.* 7s. 6d. On this basis it was contended that the award ought to be for 214*l.* 10s.

At the conclusion of the arguments of counsel, their Lordships held that the learned County Court Judge had dealt with the case in accordance with the law as laid down by the House of Lords in the case of "Lyons *v.* Andrew Knowles & Sons," and dismissed the appeal with costs.

Mr. Atherley Jones, K.C., and Mr. Kisch appeared for the appellant (the employer), and Mr. R. M. Bray, K.C., and Mr. W. M. Thompson for the respondent (the widow).

RECENT PATENTS:

ABSTRACTS OF PATENTED INVENTIONS.

12,307.—An Appliance for Water-closets: *F. Beresford.*—The invention relates to a form of mechanism which works an inlet water-valve by means of the opening and closing of the seat-lid, on which is mounted a bracket having a ball or roller at the head. On the end of the valve-spindle is a double incline upon which the ball will act, whereby the valve will become quite opened. When the lid is half closed or half opened a spring in an air-chamber closes the valve, for which an air-cushion is provided. Rods and levers from the seat-lid will work the lid at the bottom of the pan.

12,317.—A Foundation for Flooring: *P. Tachard.*—A lower layer is made of an admixture of sawdust, thirty parts by weight, oxide of magnesium, thirty-five parts, and a solution of chloride of magnesium, four and a half parts, above that is spread a layer compounded of oxide of magnesium, asbestos, wood-meal, cale spar, chloride of magnesium solution, and some colouring matter in certain given parts; if only one homogeneous layer is employed the relative parts of the components are varied.

12,320.—Wire Fences: *W. Edenborn.*—The inventor feeds the wires lengthwise through hollow spindles, and the stay-wires between rollers and cam-rollers having an intermittent motion, whilst pawls will prevent the wires from returning; between the spindles are spring-fitted grooves in discs which take the stay-wires, and as their lengths are cut off the discs are caused to rotate so as to bring the stay-wires and the adjacent strand-wires together, a sliding head that is worked with a cam carries forks which cause the stay-wires to engage with the coiling-fingers which coil them about the spindles, and will straighten them. Confer also No. 8,343 of 1896.

12,331.—Electrical Conduits: *E. Schellbach.*—The outer casing of a sectional multiple conduit has its shell made of cement, &c., and has grooves or openings for taking tie-rods lengthwise; a lighter material is filled in the interior and is moulded with rounded openings. In another form the portion within consists of a casing having a movable top, and the tie-rods are fitted in the inner casing instead. The interior will serve for pipes laid upon pierced

insulating-partitions and for naked wires to be drawn through the partitions.

12,380.—A WORKMEN'S TIME-RECORDER: *J. S. MacCoy.*—For stamping it with the date and time, the card, when it has been dropped into a shoot, is held with a pivoted detent against the printing-wheels, whilst a cam and hand-lever mechanism works a lever at the end of a platen that strikes the card. At the same moment the platen drives a punch which removes a piece from the card, a cam is raised to clear a pivoted pallet upon a vertical shaft by an arm which, with the hand-lever, works upon another arm, so as to wind up a train-controlled spring, thereby the cam is returned over the pallet, and by turning the shaft disengages the detent to which it is linked. A band between two winding-reels inks the type, the reels being driven in alternation by a shifting shaft having mitre-gearing at its end. The shaft is shifted by means of its two end levers beneath springs and a detaining latch which is tripped with a trigger.

12,392.—A CLAMP FOR CONDUCTORS AND FUSES: *Callender's Cable and Construction Co. and J. C. A. Ward.*—Two discs pressed together by a spring and an eccentric and mounted upon a pin, constitute the clamp; the spring is put under the lower disc, and above the other disc a forked eccentric is pivoted on a pin that works in a slot in the disc-pin; the disc-pin may, otherwise, be forked so that the eccentric can move between its legs.

12,418.—A ROAD SCARIFIER: *W. Thackray and W. L. Thackray.*—The two sides of the machine are joined with stays and mounted upon wheels; lateral bearing-bosses carry the shaft, and as the sides are constructed in parts they can be adjusted for their attachment to a traction-engine; double-ended prongs are keyed into levers upon a shaft, and the levers are linked to regulating-levers upon a shaft, whilst spring catches upon the former levers engage with recesses in segments upon the side plates; the steering-wheels can be carried by an axle which is fitted to an upright mounted in a bearing in the bridge-piece affixed to the sides.

12,436.—PROTECTION FROM FIRE: *J. D. Gould.*—The fire-alarm comprises a cable wherein a layer of some insulating material separates an outside conductor from an inside fusible conductor, wires connect the other ends of the conductors to the metallic ends of the reel, which takes the surplus cable, the ends being disposed in metallic connexion with the terminals of an electrical-bell circuit. When a fire breaks out near the cable, the inside conductor becomes fused, and as it makes its way through the insulating material effects contact with the outside conductor, so as to close the bell-circuit and raise an alarm.

12,446.—BRICKS FOR CEILINGS AND FLOORS: *F Alorecht.*—The bricks are fashioned with interlocking corrugations or waved ribs and grooves arranged lengthwise. They may also be hollow, for reducing their weight and for deadening sound.

12,475.—TOPS FOR CHIMNEY AND VENTILATING SHAFTS: *W. Mitchell.*—As an improvement upon No. 19,266 of 1897, and in order to prevent the top from being blown quite round by the wind, the inventor devises a brake-block that will hang freely in a light wind, but will be actuated by a breeze. When three chimney-pots are fixed upon one stack the two outside pots are elbowed into the top which is secured to the pot between them.

12,498.—LADDERS FOR SCAFFOLDING: *I. Szalay and J. Korom.*—At the upper ends of the ladder ends are sockets for the feet of the sections next above them, for fastening the sections to one another parallel-wise are used screwed shackles and cross-braces that are to be bolted to one another as well as to the sides of the ladders.

12,501.—A STAGING FOR USE IN CLEANING AND PAINTING WINDOWS, &C.: *I. Page.*—The apparatus consists of a frame covered with wire-netting which stands upon the window-sill and is secured with adjustable screw coupling-nuts or turn-buckles to hooks inside the room, jointed links secure the hinged back of the frame, and to the back are hinged folding side-wings which are also pivoted with catches on to the links.

12,513.—AN ARTIFICIAL STONE: *Wachtel & Co.*—The stone is made of coarse-grained and fine-grained sands in the ratio 2 : 1 mixed with lime, the former having been dried at a temperature of 100 deg. C. or higher, and made up with slaked lime to the consistency of a paste.

12,593.—DRAWING INSTRUMENTS: *H. E. Ablett.*—A set-square for drawing regular polygonal figures has each of its corners cut to the angle of a regular polygon which is bisected with a line of holes, the radius of the circumscribing circle is determined by means of the engagement of any hole with a fixed centre which has been struck on the paper, whilst the length of the side of the figure that corresponds with the given radius is obtained from the intersection of a line drawn from each hole to the edge of the set square; a detached and perforated strip is provided for drawing radii and circles.

12,605.—MEANS OF WARMING BUILDINGS: *J. Russell.*—The invention lies in the maintenance of the circulation of the heating vapour or steam by making a vacuum in the return portion of the system, and preventing the passage of the steam or vapour into the return pipes, the water of condensation and the air in the condensed vapour being enabled to escape. A float-valve or trap and a permanent by-pass for the air are placed in the outlet or condensed water-main of each radiator, heater, or coil, the by-pass serving as a spindle for a double-beat valve, and an opening in the tube between the valves leads into the passage that communicates with the outlet. Another kind of trap has one valve that is worked with a float having a pivoted arm through which is passed the tube upon which the valve is mounted.

12,648.—A METHOD OF FIXING FLOOR BOARDS: *R. Endres.*—For fastening the boards on to the joists and beams are devised nails that are pointed at both ends and can be driven slantwise to be out of sight, the adjoining board is driven up against the upper end of the nail which is turned down horizontally, a tool having a rounded recess for taking the nail-points is used for driving in the nails.

11,654.—A CIRCULAR-SAW GUARD: *D. A. Murdoch and F. Murdoch.*—The inventors contrive that the pressure of the wood as it is fed forward shall automatically raise the guard. A frame upon either side of the saw, and of which the openings are filled with "expanded metal," constitutes a shield whereof the rear end is joined by radius bars to an axis that rotates in bearings upon the horizontal arm of a standard. On the top of the shield is a wheel running upon the edge of a bracket secured to the arm. When the pressure of the wood lifts the shield, a counter-weight balances the weight of the shield and the radius-bars, and the latter (together with the wheel on the bracket) regulate the horizontal rising of the frame.

12,672-3.—MANUFACTURE OF GLASS: *A. Voelker.*—Worms from hoppers feed the raw materials to the electrical furnace, and heat from an arc between carbon electrodes fuses the materials; the molten glass is further heated in a clearing-tank for clearing away air-bubbles with an electrical current that is passed between electrodes through the tank, and the glass can be maintained at the desired heat by a current passed through the receiving-tank. (12,673.) Graphite, powdered charcoal, or other conducting substances are mixed with the ground raw materials, which are then melted with an electrical current that is passed through the admixture.

12,714-5.—TOPS FOR VENTILATING-SHAFTS: *J. Linkleter.*—The inventor provides a long mouth-piece, shaped as a hood, and as wide as the down-take pipe, which has a wind-vane and ball-bearings that work in a ring. He also devises a semi-circular, or hemi-cylindrical, screen, which carries a directing-vane as an addition to the customary revolving fly, or slit-drum.

12,716.—A CONTRIVANCE FOR ELECTRICAL SWITCHES: *W. B. Dale.*—The contact is so arranged as to be always parallel to the plane of the contacts, and to thereby give a wide double break. In the case of a double-pole switch a cross-piece carries the contact-bars, and to its arms are pivoted two levers of which the other ends are pivoted to a bracket. For giving a quick break a spring connects the bars, to one of which a handle is loosely connected.

MEETINGS.

FRIDAY, NOVEMBER 8.

Architectural Association Discussion Section.—Mr. W. E. Davis on "The Finishing of a Dwelling-house." 7.30 p.m.

The Technical College Architectural Craftsmen's Society.—Mr. Robert Stuart on "Soft Wood," and Mr. D. S. Pringle on "Hard Wood," 204, George-street, Glasgow. 8 p.m.

MONDAY, NOVEMBER 11.

Surveyors' Institution.—Opening Address by the President, Sir John F. L. Rolleston, M.P. 8 p.m.

Clerks of Works' Association, Carpenters' Hall.—Paper by Mr. J. T. Micklethwaite. 7.30.

Bristol Society of Architects.—Mr. John Fisher on "The Work of Alfred Stevens," with limelight illustrations. 8 p.m.

TUESDAY, NOVEMBER 12.

Institution of Civil Engineers.—Messrs. W. Kaye Parry, M.A., and W. E. Adeney, D.Sc., on "The Discharge of Sewage into a Tidal Estuary." 8 p.m.

WEDNESDAY, NOVEMBER 13.

Institute of Sanitary Engineers.—General Purposes and Finance Committee at 4 p.m. Council meeting at 7 p.m.

Northern Architectural Association.—The President (Mr. Frank Caws) will deliver his Inaugural Address. 7.30 p.m.

THURSDAY, NOVEMBER 14.

Manchester Society of Architects.—Mr. Paul Waterhouse, M.A., on "Architecture Among the Modern Arts." 7 p.m.

Sheffield Society of Architects and Surveyors.—Mr. C. F. Brindley on "Organ Cases and Organ Chambers."

Institution of Electrical Engineers (Dublin Local Section).—Mr. P. S. Sheardown on "An Account of the German Tour of the I.E.E."

FRIDAY, NOVEMBER 15.

Architectural Association.—Mr. Max Clarke on "The Sanitation of a Country House." 7.30 p.m.

Institution of Mechanical Engineers.—8 p.m.

SATURDAY, NOVEMBER 16.

Dundee Institute of Architecture.—Visit to St. Andrews.

SOME RECENT SALES OF PROPERTY:

ESTATE EXCHANGE REPORT.

October 10.—By FAVERMAN & Co. (at Leamington).

Leamington Spa, Warwick.—1, Regent-grove, f.	£625

October 15.—By J. C. PLATT (at Hammersmith).

Hammersmith.—143, The Grove, u.t. 75 yrs., g.r. 11*l.*, e.r. 60*l.*	620
34 and 36, Studland-st., f.	820
Shepherd's Bush.—1, St. Stephen's-av., u.t. 52 yrs., g.r. 7*l.*, e.r. 45*l.*	388

October 22.—By SEDGWICK, SON, & WEALL (at Watford).

Watford, Herts.—99, Queen's-rd., f., r. 28*l.*	480
71 and 73, Sutton-rd., f.	375
New Bushey, Herts.—53 and 55, Villiers-rd., f.	390
Villiers-rd., &c., two plots of land, f.	295
2, Lower Paddock-rd., f.	265
96 and 98, Villiers-rd., f.	266
Croxley Green, Herts.—New-rd., Rosebank Cottages (2), f.	335

By W. R. NICHOLAS & Co. (at Shrewsbury).

Pontesbury, Salop.—The Longden Hall Farm, 311 a. or. 39 p., f.	7,850

October 22 and 23.—By LUDLOW & BRISCOE (at Wolverhampton).

Upper and Lower Penn, &c., Staffs.—The Lloyd Estate (second portion), 1,225 acres (in numerous lots), f.	63,558

October 23.—By WORSFOLD & HAYWARD (at Sandwich).

Eastry, Kent.—Hill House, f.	800

October 24.—By BAXTER, PAYNE & LEPPER (at Bromley)

Bromley, Kent.—65, Masons Hill, f., e.r. 50*l.*	770
87 and 89, Widmore-rd., u.t. 60 yrs., g.r. 12*l.*, r. 78*l.*	645
54, 56 and 58, Pope-rd., f.	770
High-st., i.g.r. 48*l.* 10s., u.t. 25 yrs, g.r. 12*l.* 10s.	450
Beckenham, Kent.—162 to 168 (even) and 172 Mackenzie-rd., u.t. 94 yrs., g.r. 30*l.*	1,205

By GRIMLEY & SON (at Birmingham).

Rock, Worcester.—The Alton Estate, 783 a. 0 r. 26 p., f.	3,200

October 25.—By GREEN & SON.

Old Kent-rd.—Earl-rd., the Patent Leather and Cloth Factory, area 9,450 ft., u.t. 21½ yrs., g.r. 19*l.*, r. 75*l.*	630
43 to 63 (odd), Earl-rd., u.t. 21½ yrs., g.r. 11*l.*	1,475
31, Charlotte-st., u.t. 21½ yrs., g.r. 5*l.*, r. 25*l.*	190
33, 35, 37, and 39, Charlotte-st., u.t. 21½ yrs., g.r. 5*l.*	580
48 to 72 (even), Rolls-rd., u.t. 30 yrs., g.r. 17*l.* 10s.	2,900
Brentford, Middx.—Eaton-buildings, f. g.r. 30*l.*, reversion in 72¾ yrs.	550

By JONES, LANG, & Co.

Aldgate.—3, Duke-st., area 450 ft., f., r. 65*l.*	1,290
City of London.—16, Pudding-lane, area 600 ft., f., r. 112*l.*	2,410

By MOSS & JAMESON.

Balham.—3, 19, and 49, Rossiter-rd., u.t. 76 yrs., g.r. 24*l.* 8s., r. 108*l.* 4s.	650
56 to 102 (even), Rossiter-rd., u.t. 72 yrs., g.r. 42*l.*, r. 144*l.*	930
46 and 48, Sistova-rd., u.t. 76 yrs., g.r. 14*l.* 14s., r. 72*l.*	560
106, Bedford Hill, u.t. 75 yrs., g.r. 14*l.* 14s., e.r. 55*l.*	270
46, Kyde Vale-rd., u.t. 73 yrs., g.r. 9*l.* 10s., r. 38*l.*	180
44, Byrne-rd., u.t. 73 yrs., g.r. 7*l.* 10s., e.r. 45*l.*	205
Tooting.—63 to 69 (odd), Beechcroft-rd., u.t. 76 yrs., g.r. 17*l.*	625
Somers Town.—23, 24, 25, 27, 29, and 30, Sidney-st., u.t. 19 yrs., g.r. 75*l.* 12s.	355

By RIDER & SONS.

Kilburn.—19, Salusbury-rd., u.t. 51 yrs., g.r. 9*l.*, r. 50*l.* 12s.	490
Hammersmith.—39, Caithness-rd., u.t. 65 yrs., g.r. 8*l.* 8s., r. 44*l.*	420
Willesden.—30 and 32, Villiers-rd., u.t. 78 yrs., g.r. 10*l.*	440

By DOUGLAS STRATFORD.

Wandsworth.—9, 13, and 15, Mallinson-rd., u.t. 66 yrs., g.r. 15*l.*, r. 96*l.*	885
Fulham.—22, Dimsdale-rd., f., r. 31*l.* 4s.	360

By W. S. WRIGHT.

Ealing.—272, 274, and 274A, Uxbridge-rd., and a plot of land in rear, f., e.r. 161*l.*	3,000

By A. J. SHEFFIELD.

Stepney.—108, Eastfield-st.; 11 and 12, Union-terrace Limehouse.—5 and 6, Three Colt-court, u.t. 95 yrs., g.r. 18*l.* 15s.	200
Poplar.—22, Prestige-st., f.	290
23, 24, and 25, Prestige-st., u.t. 56 yrs., gr. 10*l.* 10s.	540
Millwall.—55 and 58, Manilla-st., f.	440
Barking, Essex.—13, 15, 17 and 19, Fisher-st., f.	440
Hackney.—Alexandra-ter., i.g.r. 31*l.* 10s., u.t. 90 yrs., g.r. 21*l.*	190
Bermondsey.—7 and 8, Melior-st., f.	800
Mile End.—17 and 19, Wolsey-st., u.t. 17 yrs., g.r. 19*l.*	205
Clapton.—85, Overbury-st., u.t. 99 yrs., g.r. 5*l.*	200

By A. SPAIN & SON (at Gravesend).

Gravesend, Kent.—60, Milton-rd., f., r. 16*l.*	290
50, Darnley-rd., f., e.r. 26*l.*	395
Milton-next-Gravesend, Kent.—30, Windmill-st., f., e.r. 30*l.*	385

By DAVID BURNETT & Co. (at Diss).

Dickleburgh, Norfolk.—Carlton Grove and 7 a. 3 r. 22 p., f.	805

October 28.—By ELLIOTT, SON, & BOYTON.

Chelsea.—34, Christchurch-st., u.t. 48½ yrs., g.r. 4*l.*, r. 34*l.*	350

October 28.—By FISHER, STANHOPE, & DRAKE.

Clapton.—210, Lower Clapton-rd., f., r. 42*l.*	700
Stoke Newington.—62, Bethune-rd., u.t. 79 yrs., g.r. 10*l.* 10s., e.r. 65*l.*	650

12, Fountayne-rd., u.t. 78 yrs., g.r. 10*l.*, e.r. 70*l.* £775

By Fred. Varley.

Holloway.—71, Landseer-rd., u.t. 62 yrs., g.r. 4*l.* 4s., r. 27*l.* 270
66, 68, 72, 74, and 76, Kingsdown-rd., u.t. 62 yrs., g.r. 31*l.* 4s. 1,295
93 to 99 (odd), Kingsdown-rd., u.t. 62 yrs , g.r. 21*l.* 1,110
Elthorne-rd., The Cordwainers Arms b.-h., u.t. 65 yrs., g.r 25*l.*, r. 100*l.* 1,470
31, Ashbrook-rd., and range of stabling in rear, u.t. 65 yrs., g.r. 6*l.*, r. 112*l.* 8s. 960
62 to 68 (even) Elthorne-rd., u.t. 73 yrs., g.r. 23*l.* 15s., r. 133*l.* 1,255
55, Elthorne-rd., u.t. 61 yrs., g.r. 14*l.*, r. 45*l.* .. 315
51, Elthorne-rd., u.t. 65 yrs., g.r. 6*l.* 10s., r. 40*l.* 315
Finsbury Park.—1, Somerfield-rd., u.t. 65 yrs., g r. 6*l.* 6s., r. 40*l.* 465

By Stimson & Sons (at Wille-den).

Willesden.—Kingthorpe-rd., &c., fifty-one plots of building land, f. (in lots) 2,673
Aldgate.—Nos. 29 and 30, area 1,200 ft., f., r. 337*l.* 10s. 8,500

October 29.—By Debenham, Tewson, & Co.

Brighton, Sussex.—16, 17, 18, and 18a, Old Steyne; 131, St. James's-st., and Sea View House, area 2,750 ft., f., r. 449*l.* 8,100

By John Bott & Sons.

Norwood.—44 and 46, Birkbeck-pl., f., e.r. 38*l.* ..
Herne Hill.—267, Norwood-rd., u.t. 69½ yrs., g.r. 6*l.* 6s., e.r. 55*l.* 770

By C. W. Davies & Son.

Highbury.—3, Witherington-rd., u.t. 83½ yrs , g.r. 8*l.* 8s., r. 50*l.* 520
26 to 36 (even), Horsell-rd., u.t. 83½ yrs., g.r. 54*l.* 5s., r. 292*l.* 2,735
21, Davenant-rd., u.t. 56½ yrs., g.r. 6*l.*, r. 38*l.* .. 345
92, Isledon-rd., u.t. 50 yrs., g.r. 8*l.*, r. 50*l.* 430
Tottenham.—29, Carlingford-rd., u.t. 89 yrs., g.r. 5*l.* 10s., r. 32*l.* 320
Islington.—1, Gordon-st., f., e.r. 34*l.* 475

By G. Haslett.

Fleet-st.—Bride-lane, the White Bear p.h., f.g.r. 100*l.*, reversion in 66 yrs. 2,950

By Peacey & Fuller.

Camden Town.—105, Park-st., u.t. 22 yrs., g.r. 20*l.*, e.r. 65*l.*, with goodwill, fixtures, &c. ..
Bexhill-on-Sea, Sussex.—Sackville-rd., Brassey House, u.t. 94 yrs., g.r. 10*l.*, r. 80*l.* 1,100

By Alfred Richards.

Tottenham.—220, St. Ann's-rd., area 5 acres, part f. and part u.t. 48 yrs., g.r. 26*l.*, r. 70*l.* 1,100
Hammersmith.—18, 20 and 22, Benbow-rd., u.t. 62 yrs., g r. 22*l.* 10s., r. 94*l.* 925
Bow.—71, Tredegar-rd., u.t. 64 yrs., g.r. 5*l.* 10s., r. 34*l.* 395

By Rutley, Son, & Vine.

Barnsbury.—23, 25, and 27, Blundell-st., u.t. 50 yrs., g.r. 18*l.* 870
Holloway.—10, Windsor-rd., u.t. 51 yrs., g.r. 5*l.*, r. 36*l.* 380
Kentish Town.—50, York Rise, u.t. 58 yrs., g.r. 8*l.*, r. 32*l.* 320

By Tyser, Greenwood, & Crier.

Chiswick.—338, High-rd., f. 5,250
375, High-rd., f., r. 85*l.* 1,815
Brentford, Middx.—1 to 6, Burdett-row, f. 495

By Fred. Warman.

Islington.—237, Essex-rd., u.t. 44 yrs., g r. 6*l.* 10s., r. 50*l.* 575
Herne Hill.—29, Lowden-rd., u.t. 65 yrs., g.r. 5*l.*, e.r. 30*l.* 235

By J. Straker & Sons (at Abergavenny).

Grosmont, Mon.—The Lawns and Lower Grounds Estate, 313 a. 3 r. 3 p., f. 10,000

October 30.—By Beal & Myrtle.

Stroud Green.—29, Albert-rd., u.t. 72 yrs., g.r. 9*l.* 620

By Dolman & Pearce.

Holloway.—Junction-rd., f.g.r. 30*l.*, reversion in 53 yrs. 900

By Guy Ewing & Co.

Edenbridge, Kent.—High-st., Orchard House, f., e.r. 75*l.* 1,500
High-st., 1 to 4, Katharine Villas and 1 to 9, Katharine Cottages, f. 2,585

By Harold Griffin.

Old Kent-rd.—26 and 28, St. Thomas-rd.; also l.g.r. 4*l.*, u.t. 56 yrs., g.r. 12*l.* 500
Peckham.—34 to 54 (even), Tilson-rd., u.t. 60 yrs., g.r. 32*l.* 1,770
Walworth.—5 to 11 (odd), Northampton-pl., u.t. 60 yrs., g.r. 20*l.* 655
161, 163, 165, Boyson-rd., u.t. 50 yrs., g.r. 18*l.* .. 870
Vauxhall.—148 to 156 (even), Tyers-st., u.t. 61 yrs., g.r. 25*l.* 1,265
Wandsworth.—1 to 23 (odd), Bridgefield-grove, u.t. 51 yrs., g.r. 36*l.* 1,505
2 to 20 (even), Coligny-st., u.t. 80 yrs., g.r. 35*l.* 1,325
1 to 15 (odd), Coligny-st., u.t. 84 yrs., g.r. 32*l.* 1,045

By Marten & Carnaby.

Dulwich.—14, Croxted-rd., u.t. 75 yrs., g.r., &c., 8*l.* 18s. 10d., e.r. 45*l.* 420

By R. Tidey & Son.

Stoke Newington.—69 and 71, Mildmay-rd., u.t. 48 yrs , g.r. 12*l.* 12s., r. 83*l.* 83
De Beauvoir Town.—169, Church rd., u.t. 38 yrs., g.r. 3*l.*, r. 40*l.* 400

By Douglas, Young, & Co.

Ilford, Essex.—Loxford-lane, a block of freehold building land, 14½ a. 5,510
Croydon.—Dartnell-rd., a plot of building land, f. 280
Stockwell.—118, Landor-road, u.t. 73 yrs., g.r. 8*l.*, r. 60*l.* 600
Notting Hill.—148, Kensington Park-rd., u.t. 50 yrs., g.r. 8*l.*, r. 55*l.* 400
13, Blenheim-cres., u.t. 50 yrs., g.r. 8*l.*, r. 45*l.* . 350

By R. Cheke & Co. (at Stratford).

Leytonstone.—15 and 17, Clarendon-rd., f., r. 60*l.* 900
Manor Park.—13, 21, 23, and 25, Morris-av., f. .. 1,095
22, Meanley-rd., u.t. 71 yrs., g.r. 5*l.* 200
60, 62, and 64, Lawrence-av., f. 700

October 31.—By Browett & Taylor.

Hampstead.—34, 36, and 38, Stanley Gardens, u.t. 61½ yrs., g.r. 27*l.* 1,680

Clapton.—38 to 50 (even), Chatsworth-rd, u.t. 74 yrs., g.r. 70*l.*, r. 342*l.* 10s. £4,100
Tottenham.—139 to 145 (odd), Welbourne-rd., u.t. 76 yrs., g.r. 18*l.* 770
Rotherhithe.—2 to 8 (even), Edale-rd., u.t. 74 yrs., g.r. 18*l.* 720
Peckham.—24, 26, and 28, Machell-rd., u.t. 74 yrs., g.r. 13*l.* 10s. 705

By Ford & Co.

Lambeth.—Chattel interest (if any) of 56, 58, 82, 84, 86, and 88, Lambeth-rd., u.t. 4½ yrs., g r. 43*l.* 14s. 255

By A. & G. Guiver.

Enfield Highway.—Main-rd., two freehold houses and shops, r. 58*l.* 1,150
Main-rd., four freehold cottages 1,060
Oatlands-rd., two freehold villas 600
Ponders End.—11, Napier-rd., u t. 57 yrs., g.r. 3*l.* 10s. 135

By Charles Hall.

Brixton.—194, Stockwell-rd., u.t. 70 yrs., g.r. 16*l.* 16s., r. 65*l.* 600

By Messrs. Kemsley.

Walthamstow.—38, Orford-rd. (off-licensed premises), f., with goodwill 2,010
63 and 65, Orford-rd., f., r. 92*l.* 900
2, East-av., f., r. 25*l.* 325

By W. Martin & Co.

Dulwich.—18 and 20, Tarbert-rd., u.t. 78½ yrs., g r. 12*l.* 12s., r. 62*l.* 645

By C. C. & T. Moore.

Bethnal Green.—21, Patriot-sq , area 3,700 ft., f.. 860
Leyton.—Boundary-rd., six plots of building land, f. 400
New Cross.—Cold Blow-lane, Pink's Spice Mills, area 32,700 ft., u.t. 54 and 14 yrs., g.r. 105*l.*, r. 200*l.* 200
Canning Town.—1 and 3, Hill-st.; also two plots of building land, f. 620
9, Custom-st., f. 175
Penge.—31, Hawthorn-grove (Mission Hall), f., r. 26*l.* 360
Kentish Town.—52, Victoria-rd , r. 50*l.*; also l.g.r. 4*l.*, u.t. 33½ yrs., g.r. nil 550

By Robins, Gore, & Mercer.

Marylebone.—14, Carburton-st., u.t. 20 yrs., g.r. 35*l.* 490

By Stimson & Sons.

Peckham.—7, 9, and 11, Chadwick-rd., f., r. 94*l.* 10s. 1,165
2 to 16 (even), Chadwick-rd., u.t. 51 yrs., g r. 28*l.*, r. 236*l.* 12s. 1,785
Tottenham Court-rd.—16, Whitfield-st., f., r. 56*l.* 1,450
Marylebone.—2, Westmoreland-st., u.t. 1¾ yrs., g.r. 20*l.*, r. 70*l.* 140
Highgate.—Hornsey-lane, Harberton, u.t. 15 y s., g.r. 18*l.*, r. 120*l.* 800
Hammersmith.—23 to 39 (odd), Chancellor-rd., u.t. 62 and 61 yrs., g.r. 45*l.*, r. 282*l.* 2,240
45, Chancellor-rd., u.t. 33 yrs., g.r. 5*l.*, r. 32*l.* .. 230
Belvedere, Kent.—1, Coleman-rd., u.t. 94 yrs., g.r. 3*l.* 305
33 to 39 (odd), 40 to 56 (even), and 60, Coleman-rd., u.t. 94 yrs., g.r. 44*l.* 10s. 2,880
Old Kent-rd.—29 and 31, Arthur-st., u.t. 17¾ yrs., g.r. 4*l.* 10s. 250
Deptford.—76, St. John's-rd., u.t. 22 yrs., g.r. 2*l.* 10s. 150
67 and 69, Napier-st., u.t. 43½ yrs., g.r. 4*l.* 350
203, Evelyn-st., u.t. 24 yrs., g.r. 2*l.* 5s. 110

By Henry Hendricks (at Birmingham).

Harborne, Staffs.—116 and 118, Vivian-rd., u.t. 69 yrs., g.r. 8*l.* 16s. 3d., r. 72*l.* 875
Aston, Staffs.—18, Burbury-st., f. 400
1 and 2, Temple-pl., f. 195
Birmingham, Warwick.—53 and 54, Park-st. and six houses in rear, area 432 yards, f. 540
Liverpool-st., a plot of building land, area 2,310 yards, f. 1,020
Balsall Heath, Worcr.—18 to 21, Upper Cox-st., f. 1,130

Nov. 1.—By Bowditch & Grant.

Croydon.—Park Hill-rd., "Netherfield," u.t. 62 yrs., g.r. 20*l.* 1,070
Selsdon-rd., "Ivy Cottage" and ¾ a., f. 1,035
41, Addiscombe-rd., u.t. 63½ yrs., g.r. 12*l.* 10s. 650
Walpole-rd., Kazarma, u.t. 61½ yrs., g.r. 12*l.* .. 380
Waddon.—Stafford-rd., Homefield, u.t. 75 yrs., g.r. 12*l.* 850

By Drysdale, Nurse, & Co.

Stoke Newington.—66, Manor-rd., u.t. 73 yrs., g.r. 9*l.* 535
17, Reighton-rd., u.t. 75 yrs., g.r. 6*l.* 10s., e.r. 42*l.* 430
Stamford Hill.—14, West Bank, u.t. 82 yrs., g.r. 10*l.*, e.r. 65*l.* 715
43, West Bank, u.t. 82 yrs., g.r. 8*l.*, e.r. 55*l.* .. 550

By Reynolds & Eason.

Brixton.—28, 30, and 32, Bishop's-rd., u.t. 59½ yrs., g.r. 12*l.* 15s. 780
Stepney.—121, St. Dunstan's-rd., u.t. 61 yrs., g.r. 3*l.* 3s., e.r. 42*l.* 355

By Alfred Preece.

Tottenham.—13 and 19, King's-rd., u.t. 60 yrs., g.r. 4*l.* 300
Highgate.—41, Woodsome-rd., u.t. 60¼ yrs., g.r. 7*l.*, r. 42*l.* 450

By T. G. Wharton.

Forest Hill.—Elsinore-rd., f.g.r.'s 63*l.*, reversion in 98½ yrs. 1,525
Battersea.—Parkside-st., f.g.r. 28*l.*, reversion in 61 yrs. 800
Elcho-st., f.g.r. 31*l.* 10s., reversion in 65 yrs. .. 745
Leyton.—Capworth-st., f g.r.'s 45*l.*, reversion in 64 yrs. 1,045
Belgravia.—56, Ebury-st , and 25 and 25A, Eccleston-st., u.t. 22 yrs., g.r. 12*l.*, r. 390*l.* 4,300

Contractions used in these lists.—F.g.r. for freehold ground-rent; l.g.r. for leasehold ground-rent; i.g.r. for improved ground-rent; g.r. for ground-rent; r. for rent; f. for freehold; c. for copyhold; l. for leasehold; e. for estimated rental; u.t. for unexpired term; p.a. for per annum; yrs. for years; st. for street; rd. for road; sq. for square; pl. for place; ter. for terrace; cres. for crescent; yd. for yard.

PRICES CURRENT OF MATERIALS.

*** Our aim in this list is to give, as far as possible, the *average* prices of materials, not necessarily the lowest. Quality and quantity obviously affect prices—a fact which should be remembered by those who make use of this information.

BRICKS, &c.

	£ s. d.			
Hard Stocks	1 12 0	per 1,000	alongside,	in river.
Rough Stocks and Grizzles	1 10 0	,,	,,	,,
Facing Stocks	2 12 0	,,	,,	,,
Shippers	2 8 0	,,	,,	,,
Flettons	1 8 0	,,	at railway	depôt.
Red Wire Cuts	1 13 0	,,	,,	,,
Best Fareham Red	3 11 0	,,	,,	,,
Best Red pressed Ruabon Facing.	5 5 0	,,	,,	,,
Best Blue Pressed Staffordshire	4 6 6	,,	,,	,,
Do., Bullnose	4 10 0	,,	,,	,,
Best Stourbridge Fire Bricks	4 4 0	,,	,,	,,
Glazed Bricks				
Best White and Ivory Glazed Stretchers	13 0 0	,,	,,	,,
Headers	12 0 0	,,	,,	,,
Quoins, Bullnose, and Flats	17 0 0	,,	,,	,,
Double Stretchers	19 0 0	,,	,,	,,
Double Headers	16 0 0	,,	,,	,,
One Side and two Ends	19 0 0	,,	,,	,,
Two Sides and one End	20 0 0	,,	,,	,,
Splays, Chamfered, Squints	20 0 0	,,	,,	,,
Best Dipped Salt Glazed Stretchers and Headers	12 0 0	,,	,,	,,
Quoins, Bullnose, and Flats	14 0 0	,,	,,	,,
Double Stretchers	15 0 0	,,	,,	,,
Double Headers	14 0 0	,,	,,	,,
One Side and two Ends	15 0 0	,,	,,	,,
Two Sides and one End	15 0 0	,,	,,	,,
Splays, Chamfered, Squints	14 0 0	,,	,,	,,
Seconds Quality White and Dipped Salt Glazed	2 0 0	,,	less than best.	

	s. d.			
Thames and Pit Sand	7 3	per yard,	delivered.	
Thames Ballast	6 0	,,	,,	
Best Portland Cement	32 0	per ton,	delivered.	
Best Ground Blue Lias Lime	25 6	,,	,,	

Note.—The cement or lime is exclusive of the ordinary charge for sacks.

Grey Stone Lime	12s 6d.	per yard, delivered
Stourbridge Fire-clay in sacks, 28s.	od.	per ton at rly. dpt

STONE.

	s. d.			
Ancaster in blocks	1 11	per ft. cube,	deld. rly.	depôt.
Bath ,,	1 7	,,	,,	
Farleigh Down Bath	1 8	,,	,,	
Beer in blocks	1 6½	,,	,,	
Grinshill ,,	1 10	,,	,,	
Brown Portland in blocks	2 2	,,	,,	
Darley Dale in blocks	2 4	,,	,,	
Red Corsehill ,,	2 5	,,	,,	
Red Mansfield ,,	2 4	,,	,,	
Hard York in blocks	2 10	,,	,,	
Hard York 6 in. sawn both sides landings, to sizes (under 40 ft. sup.)	s. d. 2 8	per ft. super	at rly.	depôt
,, ,, 6 in. Rubbed Ditto	3 0	,,	,,	
,, ,, 3 in. sawn both sides slabs (random sizes)	1 3	,,	,,	
,, ,, 3 in. self-faced Ditto	0 9½	,,	,,	
Hopton Wood (Hard Bed) in blocks	2 3	per ft. cube. deld.	rly.	depôt
,, ,, ,, 6-in sawn both sides landings	2 7	per ft. super. deld.	rly.	depôt.
,, ,, ,, 3-in. do.	1 2½	,,	,,	

SLATES.

in. in.	£ s. d.			
20×10 best blue Bangor	11 5 0	per 1000 of 1200	at ry.	dep.
,, best seconds ,,	10 15 0	,,	,,	
16×8 best ,,	6 2 6	,,	,,	
20×10 best blue Portmadoc	10 18 0	,,	,,	
16×8 best blue Portmadoc	6 0 0	,,	,,	
20×10 best Eureka unfading green	11 2 6	,,	,,	
16×8 ,, ,,	6 15 0	,,	,,	
20×10 Permanent green	10 0 0	,,	,,	
16×8 ,, ,,	5 12 6	,,	,,	

TILES.

	s. d.			
Best plain red roofing tiles	41 6	per 1,000	at rly.	depôt
Hip and valley tiles	3 7	per doz.	,,	,,
Best Broseley tiles	48 6	per 1,000	,,	,,
Hip and valley tiles	4 0	per doz.	,,	,,
Best Ruabon Red, brown or brindled Do. (Edwards)	57 6	per 1,000	,,	,,
Do. ornamental Do.	60 0	,,	,,	,,
Hip tiles	4 0	per doz.	,,	,,
Valley tiles	3 9	,,	,,	,,
Best Red or Mottled Staffordshire Do. (Peakes)	50 9	per 1,000	,,	,,
Hip tiles	4 1	per doz.	,,	,,
Valley tiles	3 8	,,	,,	,,

WOOD.

Building Wood.—Yellow.

	At per standard. £ s. d.	£ s. d.
Deals: best 3 in. by 11 in. and 4 in. by 9 in. and 11 in.	13 10 0	15 10 0
Deals: best 3 by 9	13 0 0	14 10 0
Battens: best 2½ in. by 7 in. and 8 in. and 3 in. by 7 in. and 8 in.	10 0 0	11 0 0
Battens: best 2½ by 6 and 3 by 6	0 10 0	less than 7 in. and 8 in.

[*See also page 425.*

COMPETITIONS, CONTRACTS, AND PUBLIC APPOINTMENTS.

(For some Contracts, &c., still open, but not included in this List, see previous issues.)

COMPETITIONS.

Nature of Work.	By whom Required.	Premiums.	Designs to be delivered
Offices and House, Dartmouth	Channel Coaling Co., Ltd.	Not stated	Nov. 20
Workmen's Dwellings, Alexandra Park	Glasgow Corporation	100*l.*, 50*l.*, 25*l.*	Feb. 1

CONTRACTS.

Nature of Work or Materials.	By whom Advertised.	Forms of Tender, &c., Supplied by	Tenders to be delivered
Sewers, Oxhill-road	Handsworth (Staffs) U.D.C.	H. Richardson, Civil Engineer, Council House, Handsworth	Nov. 12
Additions to Schools, Southend	Sutton & Shopland Sch. Managers	N. Y. Hobbiss, Architect, 57, High-street, Southend	do.
House, Grange Moor	Huddersfield Co-op. Society	J. Berry, Architect, 9, Queen-street, Huddersfield	do.
Wall, &c., at Workhouse, Crumpsall	Manchester Guardians	A. J. Murgatroyd, Architect, 23, Strutt-street, Manchester	Nov. 13
Alterations to Premises, Charlotte-street	Leith (N.B.) Town Council	Mr. Simpson, Architect, Council Chambers, Leith	do.
Additions to Workhouse, Limerick	.....	Carroll & Batchelor, Architects, 86, Merrion-sq. South, Dublin	do.
Stoneware Pipes	Chepping Wycombe Corporation	T. J. Rushbrooke, Borough Surveyor, Wycombe	do.
Retaining Wall, Spotland Bridge	Rochdale Corporation	S. S. Platt, Borough Surveyor, Town Hall, Rochdale	do.
Additions to Waggon Works, Tyne Dock	North-Eastern Railway Company	W. Bell, Architect, Central Station, Newcastle	do.
Sewerage Works, Middleton	Ashbourne R.D.C.	I. Sheldon, Council Offices, Ashbourne	do.
Five Houses, Morrison-street, Castleford	Mr. E. Sidwell	R. M. M'Dowall, Architect, Carlton-street, Castleford	do.
*Six Houses, Lewes	Lewes Co-op. Society, Limited	T. W. Franks, Architect, Lewes	do.
*Goods Warehouse, Northampton	Midland Railway Company	Company's Architect, Cavendish House, Derby	Nov. 14
Alterations, Royal Oak Inn, New Bilton	Messrs. Phillips & Marriott, Ltd.	H. W. Chattaway, Architect, Trinity Churchyard, Coventry	do.
Sewerage Works, Glass Houghton	Pontefract R.D.C.	W. L. Le Maitre, Civil Engineer, Greek-street Chambers, Leeds	do.
Church Tower and Spire, Castleisland, co. Kerry	.....	D. J. Coakley, Architect, 1, Charlotte-quay, Cork	do.
Sewerage Works	Hoyland Nether U.D.C.	W. P. Young, Surveyor, Town Hall	do.
Surveyor's Materials	Cork Town Council	City Engineer, Municipal Buildings, Cork	do.
Paving Works, Fylde-road, &c.	Preston (Lancs) Corporation	Borough Surveyor, Town Hall, Preston	Nov. 15
Street Mains	St. Anne's-on-Sea (Lancs) U.D.C.	P. J. S. Tiddeman, Engineer, Electricity Works, St. Anne's	do.
Surveyor's Materials, Witton, near Birmingham	Messrs. Kynoch, Ltd.	Secretary, Kynoch's, Ltd., Lion Works, Witton, Birmingham	do.
School, Haugh Shaw	Halifax School Board	C. F. L. Horsfall & Son, Architects, Halifax	Nov. 16
Sewerage Works, Tollesbury	Maldon (Essex) R.D.C.	H. G. Keywood, Civil Engineer, Public Hall Chambers, Maldon	do.
Electricity Works	Chesham U.D.C.	J. G. How, Council Offices, Chesham	do.
Fire Escape Stairs, &c., Dutton	Runcorn Guardians	G. F. Ashton, 71, High-street, Runcorn	do.
*Wrought-iron Fencing and Supply of Gravel	London County Council	Parks Department, 11, Regent-street, S.W.	Nov. 18
Paving Works, High-street, &c	Wednesbury Corporation	E. M. Scott, Borough Engineer, Town Hall	do.
Workhouse Bakery, Shaw Heath	Stockport Guardians	J. Hunt & Son, Architects, 4, Warren-street, Stockport	do.
60 Houses, Pontlottyn, Wales	.....	T. Roderick, Architect, Aberdare	do.
Five Shops and Houses, near Barrow-in-Furness	.....	Secretary, Isle of Walney Estates Company, Ltd., Walney	do.
Reservoir, Pinmacher Burn	Girvan (N.B.) Town Council	J. & H. V. Eaglesham, Civil Engineers, Wellington Chambers, Ayr	do.
Schools, Hayle, Cornwall	.....	S. Hill, Architect, Redruth	do.
Drainage and Road Works, Pontlottyn, Wales	.....	T. Roderick, Architect, Aberdare	do.
Road Works, East Park-road	Blackburn Corporation	W. Stubbs, Engineer, Municipal Offices, Blackburn	do.
Street Works, Kelly-street, &c.	do.	do.	do.
Alterations to Buildings, Witton	do.	do.	do.
Engine and Boiler House, &c. (Contract No. 14)	Bournemouth Town Council	F. W. Lacey, Civil Engineer, Municipal Offices, Bournemouth	do.
Inn, Charlestown, near Hebden Bridge	.....	W. H. D. Horsfall, Architect, Halifax	do.
Electricity Station, Addiscombe-grove	Croydon Town Council	Borough Engineer, Factory-lane, Croydon	do.
Works at Garn Schools	Blaenavon (Mon.) School Board	Lansdowne & Gibbs, Architects, Newport, Mon	Nov. 19
*Jobbing Works (three years)	Corporation of London	Engineer's Office, Guildhall, E.C.	do.
*Pipe Sewer	do.	do.	do.
Road Improvement Works, Beddington, Coulsdon, &c.	Croydon R.D.C.	R. M. Chart, Surveyor, Town Hall, Croydon	Nov. 20
Reservoir, Kilburn, York	Easingwold R.D.C.	Fairbank & Sons, Civil Engineers, 13, Lendal, York	Nov. 21
Additions to Wern Schools, Ystalyfera	Llanguicke School Board	W. W. Williams, Architect, 65, Wind-street, Swansea	Nov. 22
*Brick Gasholder Tank	New Swindon Gas Co.	The Secretary, Gas Offices, Swindon	Nov. 23
Hospital, Fall Birch-lane	Horwich Hospital Committee	Cressey & Keighley, Architects, Morecambe	Nov. 25
*New County Court, Middlesbrough	Commissioners of H.M. Works, &c.	H.M. Office of Works, Storey's Gate, S.W.	do.
*Tenement Houses, Canning Town	West Ham Council	Borough Engineer, Town Hall, West Ham, E.	Nov. 26
*New Coastguard Buildings, Northumberland	Admiralty	District Clerk of Works, 21, Bootham-terrace, York	Nov. 29
*Engineering Work to Baths, Laundry, &c., Wells-st.	Camberwell Borough Council	Borough Engineer, Town Hall, Camberwell	Dec. 2
*Removal of House Refuse	St. Marylebone Borough Council	Town Hall, St. Marylebone, W.	Dec. 3
*Erection of New Infirmary, &c.	Warwick Union	F. P. Trepess, Architect, 8, Jury-street, Warwick	Dec. 5
*New Dock	Hull Joint Dock Committee	Sir John Wolfe Barry, 21, Delahay-street, Westminster	Dec. 6
Viaduct over River Barrow, South of Ireland	Fishguard & Rosslare Railways Co.	Sir B. Baker, 2, Queen Square-place, Westminster, S.W.	Dec. 16
*Museum Building, Middlesbrough	A. J. Dorman, Esq.	J. M. Bottomley, Architect, Middlesbrough and Leeds	No date
*Additions to Littlemore Asylum, near Oxford	The Committee of Visitors	.....	do.
Five Pairs Houses, Bolsover	.....	W. H. Wagstaff, Architect, Chesterfield	do.
Billiard Room, The Woodlands, Burley, Leeds	Mr. W. Plews	T. Winn & Sons, Architects, 92, Albion-street, Leeds	do.
Additions to Warehouses, Millicent-street, Cardiff	Messrs. J. Isaac & Sons	E. G. C. Down, Architect, 31, High-street, Cardiff	do.
Cottages, Kingston, Shoreham	Steyning Guardians	Clayton & Black, Architects, 152, North-street, Brighton	do.
Twelve Houses, Avenue Estate, Southend	.....	F. A. Knight, Surveyor, 2, Wetherby-terrace, Earl's Court, S.W.	do.
Road, Howick	.....	C. B. Winder, 15, Albert-road, Southport	do.
Roads at Cemetery	Deal Burial Board	J. R. Hammond, 23, Queen-street, Deal	do.
House, Wood, South Tawton, Devon	Mr. W. Lethbridge	J. Jerman, Architect, 5, Bedford-circus, Exeter	do.
Alterations to Railway Tavern, Washington, Durham	.....	G. Stephenson, Architect, 20, Collingwood-street, Newcastle	do.
Chimney (100 ft. high), Batley	.....	A. Jackson, Honley Park Colliery, Batley	do.
Additions to Schools	Conisborough (Yorks) School Bd.	G. White, Architect, Mexborough	do.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Application to be in
*Building and Drainage Inspector	Twickenham U.D.C.	2*l.* 10s. per week	Nov. 16
*Road Surveyor	Hackney Borough Council	156*l.*	Nov. 19
*Correspondence and General Clerk	do.	120*l.*	do.
*Junior Draughtsman and Clerk	do.	80*l.*	do.
*Assistant Lecturer in Civil Engineering	Hartley College, Southampton	120*l.*	Nov. 20
*Assistant Examiner in H.M. Office of Works, &c.	.....	Not stated	Nov. 28

Those marked with an asterisk (*) are advertised in this Number. ***Competitions, p. iv.*** ***Contracts, pp. iv. vi. viii. x. & xxiv.*** ***Public Appointments, pp. xxi. & xxiv.***

PRICES CURRENT (*Continued*).

WOOD.

	£ s. d.	£ s. d.
	At per standard.	
Deals: seconds	1 0 0	less than best
Battens: seconds	0 10 0	" " "
2 in. by 4 in. and 2 in. by 6 in.	8 10 0	9 10 0
2 in. by 4½ in. and 2 in. by 5 in.	8 0 0	9 0 0
Foreign Sawn Boards—		
1 in. by 1½ in. by 1½ in.	0 10 0	more than battens.
¾ in.	1 0 0	"
Fir timber: Best middling Danzig or Memel (average specification)	At per load of 50 ft.	
	4 10 0	5 0 0
Seconds	4 5 0	4 10 0
Small timber (8 in. to 10 in.)	3 12 6	3 15 0
Swedish balks	2 15 0	3 0 0
Pitch pine timber (32 ft.)	3 0 0	3 10 0
JOINERS' WOOD.	At per standard.	
White Sea: First yellow deals, 3 in. by 11 in.	22 0 0	23 0 0
3 in. by 9 in.	20 0 0	21 0 0
Battens, 2½ in. and 3 in. by 7 in.	15 0 0	16 0 0
Second yellow deals, 3 in. by 11 in.	17 0 0	18 0 0
" " 3 in. by 9 in.	15 10 0	16 10 0
Battens, 2½ in. and 3 in. by 7 in.	12 0 0	13 0 0
Third yellow deals, 3 in. by 11 in. and 9 in.	12 10 0	13 10 0
Battens, 2½ in. and 3 in. by 7 in.	10 10 0	11 10 0
Petersburg: first yellow deals, 3 in. by 11 in.	19 0 0	20 0 0
Do. 3 in. by 9 in.	16 0 0	17 0 0
Battens	12 10 0	13 0 0
Second yellow deals, 3 in. by 11 in.	14 0 0	15 0 0
Do. 3 in. by 9 in.	13 0 0	14 0 0
Battens	11 0 0	12 0 0
Third yellow deals, 3 in. by 11 in.	11 10 0	12 10 0
Do. 3 in. by 9 in.	11 0 0	12 0 0
Battens	10 0 0	11 0 0
White Sea and Petersburg:—		
First white deals, 3 in. by 11 in.	13 10 0	14 10 0
" " " 3 in. by 9 in.	12 10 0	13 0 0
Battens	10 10 0	11 10 0
Second white deals 3 in. by 11 in.	12 10 0	13 10 0
" " " 3 in. by 9 in.	12 0 0	12 10 0
" " battens	9 10 0	10 10 0
Pitch pine: deals	16 0 0	18 0 0
Under 2 in. thick extra	0 10 0	1 0 0
Yellow Pine—First, regular sizes	32 0 0	33 10 0
Broads (12 in. and up)	2 0 0	more.
Oddments	22 0 0	24 0 0
Seconds, regular sizes	24 10 0	26 10 0
Yellow Pine Oddments	20 0 0	22 0 0
Kauri Pine—Planks, per ft. cube	0 3 6	0 4 6
Danzig and Stettin Oak Logs—Large, per ft. cube	0 2 6	0 3 0
Small " "	0 2 3	0 2 6
Wainscot Oak Logs, per ft. cube	0 5 0	0 5 6
Dry Wainscot Oak, per ft. sup. as inch	0 0 8	0 0 7
¾ in. do. do.	0 0 7	- - -
Dry Mahogany—		
Honduras, Tabasco, per ft. sup. as inch	0 0 9	0 0 11
Selected, Figury, per ft. sup. as inch	0 1 6	0 2 0
Dry Walnut, American, per ft. sup. as inch	0 0 10	0 1 0
Teak, per load	16 0 0	20 0 0
American Whitewood Planks—Per ft. cube	0 3 0	0 3 6
Prepared Flooring—	Per square	
1 in. by 7 in. yellow, planed and shot	0 13 0	0 16 6
1 in. by 7 in. yellow, planed and matched	0 13 6	0 17 6
1¼ in. by 7 in. yellow, planed and matched	0 15 0	1 0 0
6 in. at 6d. per square less than 7 in.		
1 in. by 7 in. white, planed and shot	0 11 0	0 12 6
1 in. by 7 in. white, planed and matched	0 11 6	0 13 6
1¼ in. by 7 in. white, planed and matched	0 13 6	0 15 6
6 in. at 6d. per square less than 7 in.		

JOISTS, GIRDERS, &c.

	In London, or delivered to Railway Vans, per ton. £ s. d.	£ s. d.
Rolled Steel Joists, ordinary sections	6 5 0	7 5 0
Compound Girders " "	8 0 0	9 0 0
Angles, Tees and Channels, ordinary sections	8 2 6	9 2 6
Flitch Plates	8 10 0	9 0 0
Cast Iron Columns and Stanchions, including ordinary patterns	7 0 0	8 0 0

METALS.

	Per ton, in London. £ s. d.	£ s. d.
IRON.—		
Common Bars	8 0 0	8 10 0
Staffordshire Crown Bars, good merchant quality	8 10 0	9 0 0
Staffordshire "Marked Bars"	10 10 0	- - -
Mild Steel Bars	9 0 0	9 10 0
Hoop Iron, basis price	9 5 0	9 15 0
" " galvanised	16 0 0	- - -
(* And upwards, according to size and gauge.)		
Sheet Iron, Black.—		
Ordinary sizes to 20 g.	10 0 0	- - -
" " to 24 g.	11 0 0	- - -
" " to 26 g.	12 10 0	- - -
Sheet Iron, Galvanised, flat, ordinary quality.—		
Ordinary sizes, 6 ft. by 2 ft. to 3 ft. to 20 g.	12 10 0	- - -
" " 22 g. and 24 g.	13 0 0	- - -
" " 26 g.	14 0 0	- - -
Sheet Iron, galvanised, flat, best quality.—		
Ordinary sizes to 20 g.	16 10 0	- - -
" " 22 g. and 24 g.	17 0 0	- - -
" " 26 g.	18 10 0	- - -
Galvanised Corrugated Sheets.—		
Ordinary sizes, 6 ft. to 8 ft. 20 g.	12 10 0	- - -
" " 22 g. and 24 g.	13 0 0	- - -
" " 26 g.	14 0 0	- - -

PRICES CURRENT (*Continued*).

METALS.

	Per ton, in London. £ s. d.	£ s. d.
IRON—		
Best Soft Steel Sheets, 6 ft. by 2 ft. to 3 ft. by 20 g. and thicker	12 5 0	- - -
" " 22 g. and 24 g.	13 5 0	- - -
" " 26 g.	14 5 0	- - -
Cut nails, 3 in. to 6 in.	9 10 0	10 0 0
(Under 3 in. usual trade extras.)		

LEAD, &c.

	Per ton, in London. £ s. d.	£ s. d
LEAD—Sheet, English, 3 lbs. & up.	14 0 0	- - -
Pipe in coils	14 10 0	- - -
Soil Pipe	17 0 0	- - -
ZINC—Sheet—		
Vieille Montagne ton	24 10 0	- - -
Silesian	24 0 0	- - -
COPPER—		
Strong Sheet per lb.	0 1 0½	- - -
Thin "	0 1 2	- - -
Copper nails "	0 1 2	- - -
BRASS—		
Strong Sheet "	0 0 11	- - -
Thin "	0 1 1	- - -
TIN—English Ingots "	0 1 3½	- - -
SOLDER—Plumbers' "	0 0 6½	- - -
Tinmen's "	0 0 8	- - -
Blowpipe "	0 0 9	- - -

ENGLISH SHEET GLASS IN CRATES.

15 oz. thirds	3d. per ft. delivered.
" " fourths	2¾d. " "
21 oz. thirds	3¾d. " "
" " fourths	3½d. " "
26 oz. thirds	5d. " "
" " fourths	4½d. " "
32 oz. thirds	6d. " "
" " fourths	5½d. " "
Fluted sheet, 15 oz.	3½d. " "
" " 21 "	4½d. " "
½ Hartley's Rolled Plate	2¾d. " "
⅝ " " "	3¼d. " "
¾ " " "	3¾d. " "

OILS, &c.

	£ s. d.
Raw Linseed Oil in pipes per gallon	0 2 9
" " " in barrels "	0 2 10
" " " in drums "	0 3 0
Boiled " " in pipes "	0 2 11
" " " in barrels "	0 3 0
" " " in drums "	0 3 2
Turpentine, in barrels "	0 2 3
" in drums "	0 2 5
Genuine Ground English White Lead per ton	22 0 0
Red Lead, Dry "	22 10 0
Best Linseed Oil Putty per cwt.	0 9 0
Stockholm Tar per barrel	1 10 0

VARNISHES, &c.

	per gallon. £ s. d
Fine Elastic Copal Varnish for outside work	0 16 6
Best Elastic Copal Varnish for outside work	1 0 0
Best Elastic Carriage Varnish for outside work	0 16 0
Best Hard Oak Varnish for inside work	0 10 6
Best Extra Hard Church Oak Varnish for inside work	0 10 6
Fine Hard Copal Varnish for inside work	0 16 0
Best Hard Copal Varnish for inside work	1 0 0
Best Hard Carriage Varnish for inside work	0 16 0
Extra Pale Paper Varnish	0 12 0
Best Japan Gold Size	0 10 6
Best Black Japan	0 16 0
Oak and Mahogany Stain	0 9 0
Brunswick Black	0 8 6
Berlin Black	0 16 0
Knotting	0 10 0
Best French and Brush Polish	0 10 0

TO CORRESPONDENTS.

NOTE.—The responsibility of signed articles, letters, and papers read at meetings, rests, of course, with the authors.

We cannot undertake to return rejected communications.

Letters or communications (beyond mere news items) which have been duplicated for other journals are NOT DESIRED.

We are compelled to decline pointing out books and giving addresses.

Any commission to a contributor to write an article is given subject to the approval of the article, when written, by the Editor, who retains the right to reject it if unsatisfactory. The receipt by the author of a proof of an article in type does not necessarily imply its acceptance.

All communications regarding literary and artistic matters should be addressed to THE EDITOR; those relating to advertisements and other exclusively business matters should be addressed to THE PUBLISHER, and *not* to the Editor.

TENDERS.

[Communications for insertion under this heading should be addressed to "The Editor," and must reach us *not later than 10 a.m. on Thursdays.* N.B.—We cannot publish tenders unless authenticated either by the architect or the building-owner; and we cannot publish announcements of tenders accepted unless the amount of the tender is given, nor any list in which the lowest tender is under £100, unless in some exceptional cases and for special reasons.]

* Denotes *accepted.* † Denotes *provisionally accepted.*

ABBOTSKERWELL (Devon).—For the erection of a house, for the School Board. Mr. S. Segar, architect, Union-street, Newton Abbot. Quantities by architect:—

Francis	£525	F. W. Fey	£446
F. A. Stacey	479	Burnell & Richards	391
Parker Bros.	470	Albert	375
J. Edwards	455	Yeoman Bros., Kingsteignton*	358

ASHTEAD (Surrey).—For the erection of house, and entrance lodge and gardener's cottage, for Mr. A. Meyers, Forest Lodge, Ashtead. Mr. Richard Lee, architect, Great Bookham:—

Cropley Brothers, Ltd., Epsom* £5,180

BELFAST.—For the erection of sexton's house, &c., for the Rev. J. Gailey. Mr. R. A. Boyd, C.E., Garfield-street, Belfast:—

Taggart Bros., Ballysillan* £215

BRYNMAWR (Wales).—For the erection of school buildings, for the School Board. Mr. F. Baldwin, architect, 13, Frogmore-street, Abergavenny:—

D. W. Davies	£6,517 0	John Jenkins	£5,990 0
D. Thomas & Son	6,420 0	F. G. Robbins	5,932 10
T. S. Foster	6,265 0	John Newcombe	5,782 10
J. G. Thomas & Son	6,180 0	John Morgan, Blaenavon*	5,576 0
W. & L. Price	6,062 13		

CANNOCK (Staffs).—For the execution of water-supply works, for the Rural District Council. Mr. R. E. W. Berrington, engineer, Bank Buildings, Wolverhampton:—

H. Holloway	£6,256 16 4	J. Owens	£4,729 0 0
J. Mackay	4,973 17 0	C. E. Carden	4,662 18 1
Braithwaite & Co.	4,900 0 0	W. H. Reading, Wolverhampton*	4,575 0 0
Embrey & Sons	4,781 5 6		

COTHERSTONE (Durham).—For the execution of sewerage works, &c., for the Startforth Rural District Council. Mr. J. E. Parker, C.E., Post Office Chambers, Newcastle-on-Tyne:—

S. Dart	£2,758 5 3	Robson & Bank	£2,240 1 3
N. & J. Lant	2,596 15 7	S. Walker	2,150 0 0
W. Carr	2,434 19 0	Isaac Hetherington, Cotherstone*	2,074 8 10
Kyle & Sons	2,380 0 0	R. Wilson (withdrawn)	1,988 0 0
G. H. Bell	2,305 9 1		
P. O. Hetherington	2,253 6 3		

[Engineer's estimate, £2,200.]

DELAMERE (Cheshire).—For foundations and basements of main building and nurse's home at the Consumption Sanatorium, for Mr. W. J. Crossley, J.P. Mr. W. Cecil Hardisty, architect, Manchester. Quantities by Mr. Charles Jackson, Manchester:—

Freeman & Co.	£6,145	Neill & Sons	£4,660
Normanton & Son	5,496	J. Byron Bury	4,645
Hamilton & Son	5,247	Brown & Son	4,348
W. Healey	5,010	Beckett & Co.	3,862
P. Hodkinson	4,898	Bullivant & Sons	3,791
Parker Bros.	4,853	Gerrard & Sons*	3,620
Wilson & Toft	4,730		

DEVIZES.—For the erection of an isolation hospital. Messrs. Bell, Withers, & Meredith, architects, 3, Salters' Hall-court, London. Quantities by Messrs. C. Stanger & Son, 21, Finsbury-pavement, London:—

William Webb	£10,816	R. B. Mullings	£9,627
Kingerlee & Sons	10,605	W. E. Chivers	9,476
Wort & Way	10,450	Henry Ash	9,379
Holloway Bros.	10,291		

DOVER.—For the execution of street improvement works for the Town Council. Mr. H. E. Stilgoe, C.E., Town Hall, Dover. Quantities by the Borough Engineer:—

Geo. Munro	£1,519 2 0	D. & G. Keeler, Dover*	£1,314 4 0
Geo. Grigg	1,470 18 4		
Austen & Lewis	1,455 6 0		

ENFIELD.—For the execution of road works, Seventh-avenue and Fotheringham-road, for the Urban District Council. Mr. Collins, Surveyor, Court House, Enfield:—

	Seventh-avenue.	Fotheringham-road.
Griffiths & Co.	£760 0 ..	£2,020 0 0
Chas. Bloomfield	728 5 ..	2,896 7 6
E. S. Betts	717 0 ..	2,600 0 0
T. Adams, Green Lanes, Wood Green*	699 0 ..	2,549 0 0

FINEDON.—For asphalting footpaths, &c. (about 4,000 yds. super), for the Finedon Urban District Council. Mr. G. F. Bearn, surveyor, Wellingborough:—

F. Barlow ..... 2s. and 2s. 3d. per sq. yd.
O. P. Drever ..... 1s. 5½d. and 2s. 2½d. per sq. yd.
Scudamore & Co., Northampton* 1s. 11d. and 2s. 1½d. per sq. yd.

FULBOURN (near Cambridge).—For additions to the Cambridgeshire, &c., Asylum, for the Visitors. Mr. A. P. MacAlister, architect, 9, Gray's Inn-square, London, and Cambridge. Quantities by Mr. E. Dermot Nixon, 9, Gray's Inn-square, London:—

Chas. Roper	£19,252 0 0	F. C. Thurman	£15,439 0 0
G. Jackson	17,100 0 0	Bell & Sons	15,428 0 0
Alfred Guy	16,996 10 6	Kettering Co-operative Builders	15,036 0 0
Shillitoe & Son	16,691 0 0	E. Willmott & Sons, Cambridge†	14,956 0 0
Coulson & Lofts	16,640 0 0	F. H. Coleman	14,044 0 0
J. & J. Bloxham	16,569 0 0	J. Cracknell	14,838 0 0
Wm. Howard	16,400 0 0	Thackray & Co.	14,795 0 0
H. Martin	15,951 0 0		
Oak Building Co.	15,495 16 0		

[Architect's estimate, £14,500.]

HASTINGS.—For the construction of sewers, &c., Hollington-lane, for the Corporation. Mr. P. H. Palmer, Borough Engineer, Town Hall, Hastings:—

C. Marchant, 26, St. George's-road, Hastings £308 18 7

See also next page.

ILFORD.—For the erection of seven houses, Henley-road, Ilford, for Messrs. Lowe & Co. Mr. A. W. Hudson, architect and surveyor, 87, Finsbury-pavement, E.C. :—

	Total for Seven Houses.	Rate per House.
Hawkey & Oldman	£2,373	£339
H. Wilson	2,170	310
B. Hart	2,135	305
T. Wilson	2,051	293
Wicks & Capon	1,785	255

LONDON.—For alterations and repairs at the Old Commodore, Whitechapel, E. Mr. Herbert Riches, architect, 3, Crooked-lane, King William-street, London, E.C. :—

S. Osborn & Sons* £766

LONDON.—For alterations at the Shaftesbury Arms, Hoxton, N. Messrs. C. Foulsham and Herbert Riches, architects, 3, Crooked-lane, King William-street, E.C., and Bromley-by-Bow, E. Quantities supplied :—

F. & T. Thorne	£2,588	Courtney & Fairbairn*	£2,375
Todd & Newman	2,543	Sheffield Bros. (withdrawn)	2,245
A. Rowe	2,488		

LONDON.—For alterations at the Barley Mow, Limehouse, E. Messrs. C. Foulsham and Herbert Riches, architects, 3, Crooked-lane, King William-street, and Bromley-by-Bow, E. :—

E. F. & T. J. Walker.	£825	W. Harper	£680
C. North	789	S. Salt*	677

LONDON.—For the erection of a pair of semi-detached houses at Streatham. Messrs. Bell, Withers & Meredith, architects, 3, Salters' Hall-court, London :—

D. Waller	£2,457	W. H. Larman, Wimbledon*	£1,600
Spencer Santo, Ltd.	2,350		
Gathercole Bros.	2,000		

NEWHAVEN (Sussex).—For the execution of sewerage works, &c., for the Urban District Council. Mr. F. J. Rayner, Town Surveyor, Newhaven, Sussex. Quantities by Town Surveyor :—

J. G. Pickard	£1,740 16 0	Grounds & Newton	£1,380 0 0
Bentham & Co.	1,571 0 0	Langridge & Son	1,194 4 0
Peerless, Dennis, & Co.	1,534 0 0	H. A. Chambers, Seaford*	1,052 3 10
Cooke & Co.	1,465 0 0		

NORTHAMPTON.—For the erection of villa residence, Bective Estate, Kingsthorpe, for Mr. E. Branch. Messrs. Mosley & Scrivener, architects, Fish-street Chambers, Northampton. Quantities by the architects :—

W. Heap	£988 15	W. Beardsmore	£930 0
Sharman & Son	955 0	A. J. Chown, Northampton*	859 0
H. Martin	950 0		

NORTHAMPTON.—For the electric lighting of the public portion of Emporium Arcade, Northampton, for the Northampton Estates and Improvements Corporation, Ltd. Messrs. Mosley & Scrivener, architects, Fish-street Chambers, Northampton :—

F. Watkin	£171 0	National Wiring Co., London*	£117 18
Lea & Warren	163 10		
Mansell	130 0		

NORTH SUNDERLAND (Northumberland).—For the erection of a house, shop, &c., Sea Houses, for Mr. Jas. Young. Mr. G. Reavell, jun., architect, Alnwick :—

John Davidson, Sea Houses, North Sunderland* £809 2 0

SILEBY (Leicester).—For the execution of sewerage works, for the Barrow-upon-Soar Rural District Council. Mr. H. Herrod, surveyor, Barrow-upon-Soar. Quantities by surveyor :—

H. Morris	£133 8 0	J. Freer, Barrow-upon-Soar*	£114 10 0
J. T. Ball	120 10 0		
F. Sleash	116 10 4		

SLIGO.—For the erection of a chapel at asylum, for the Committee. Sir T. N. Deane & Son, architects, 15, Ely-place, Dublin. Quantities by Mr. D. W. Morris, Harcourt-street, Dublin :—

Denis McLynn	£1,100 0 0	Chas. Connolly	£1,012 15 5
John Clarence, Sligo*	£798 0 0		

WITHAM (Essex).—For the erection of a school, Chipping Hill, for the School Board. Mr. W. P. Perkins' Surveyor, Urban District Council Offices, Witham. Quantities by the architect :—

Richards & Sons	£1,345 5	H. Potter	£1,050 0
Cracknell & Baker	1,230 12	J. McKay	1,050 0
E. West	1,087 0	Smith & Son, Witham*	1,015 0
F. Johnson	1,059 0		

[Architect's estimate, £1,122.]

Cottage Homes, Shirley Lodge Farm, Woodside, Croydon.—In reference to the list of tenders for this work, printed in our last issue, "Bowyer & Co." should have been given as J. & C. Bowyer. We printed the list as it was sent to us.

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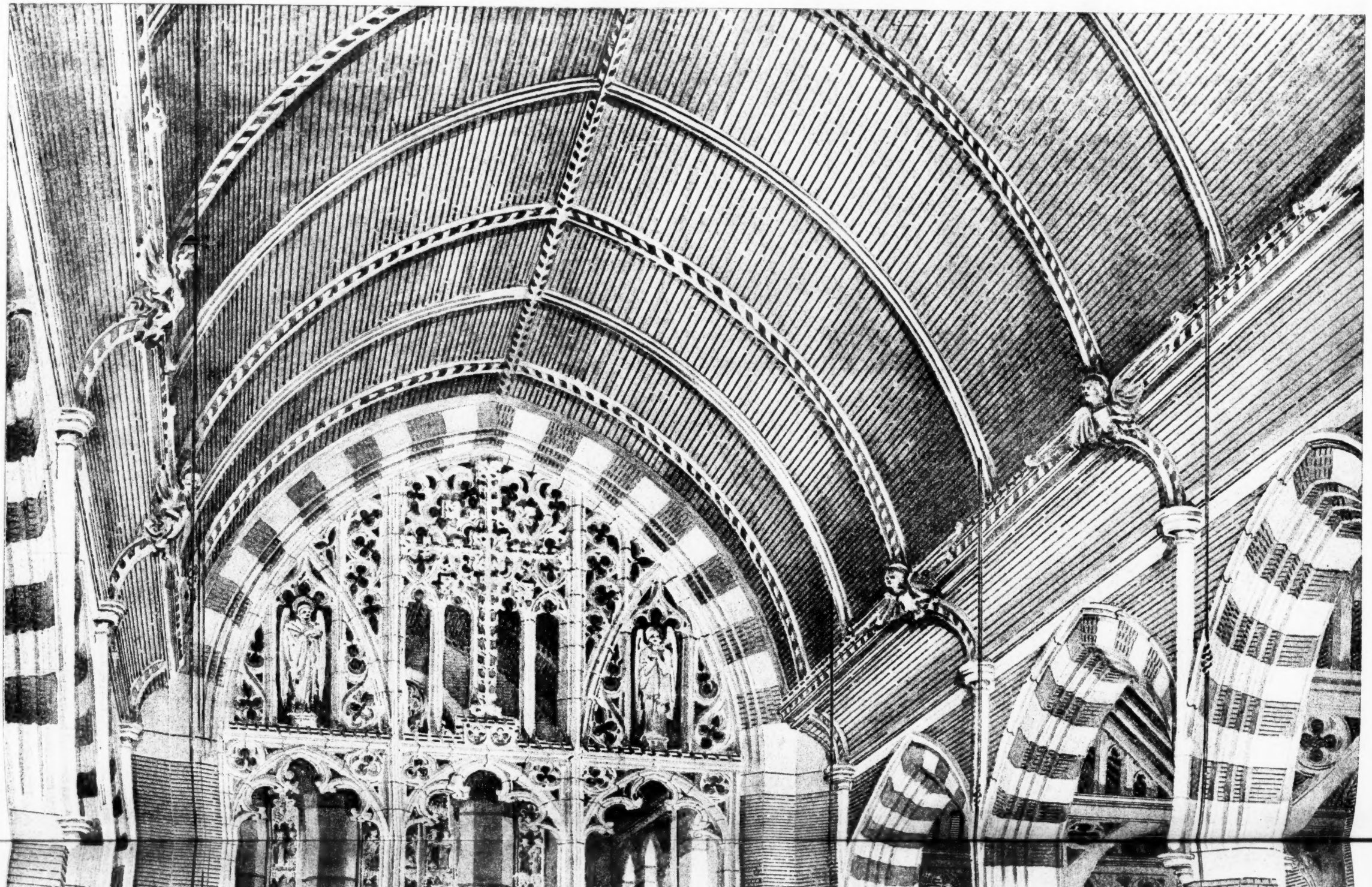

CHRIST CHURCH, LOWER SYDENHAM—Mr. G H. Fellowes Prynne, F.R.I.B.A., Architect

INTERIOR.

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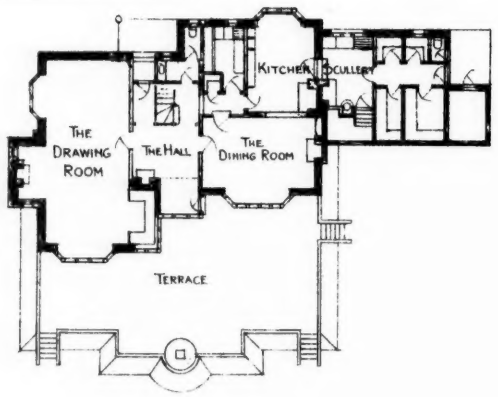
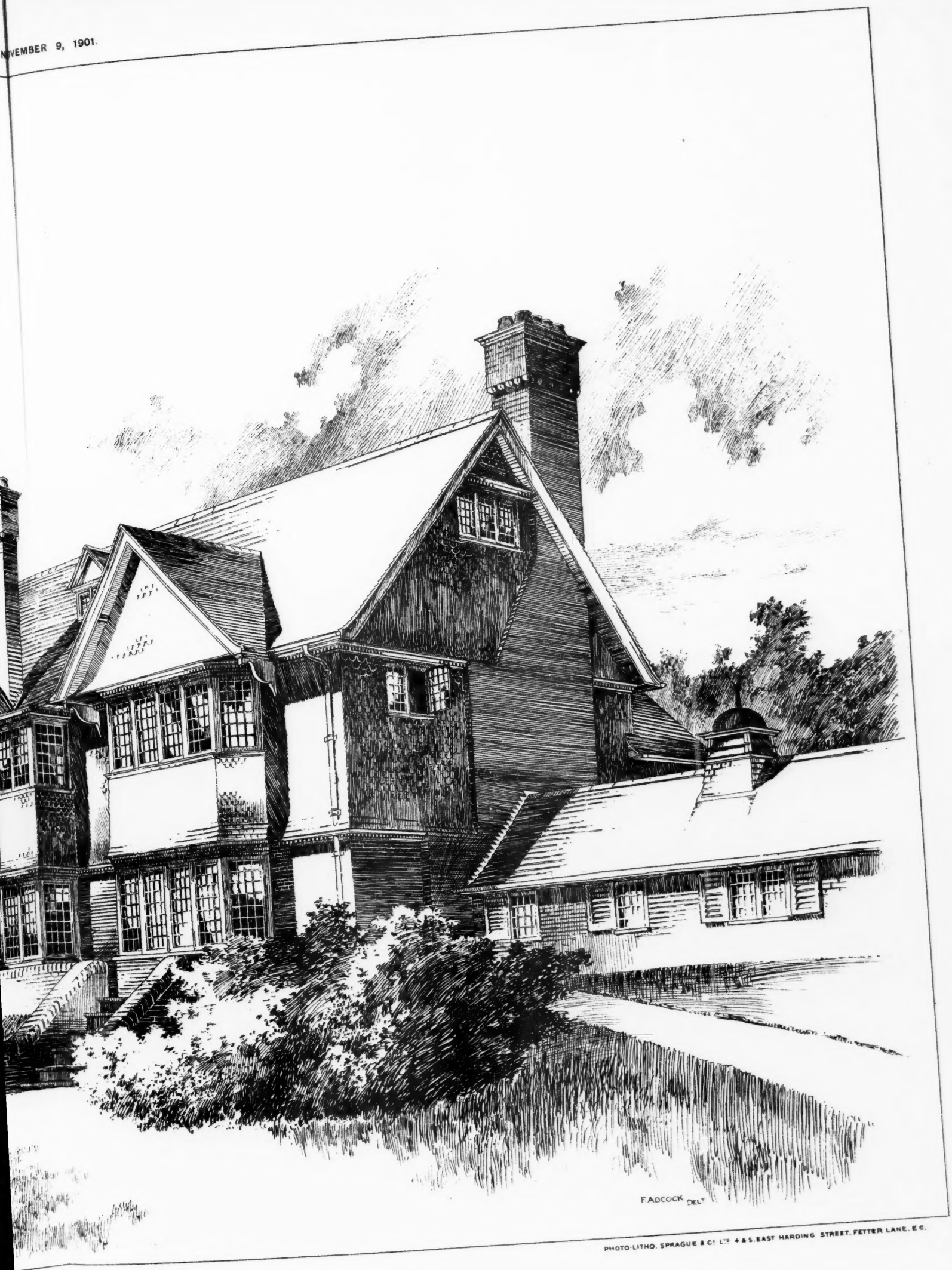
FOR SIR BENJAMIN BAKER KCMG
ARNOLD MITCHELL : ARCHITECT :





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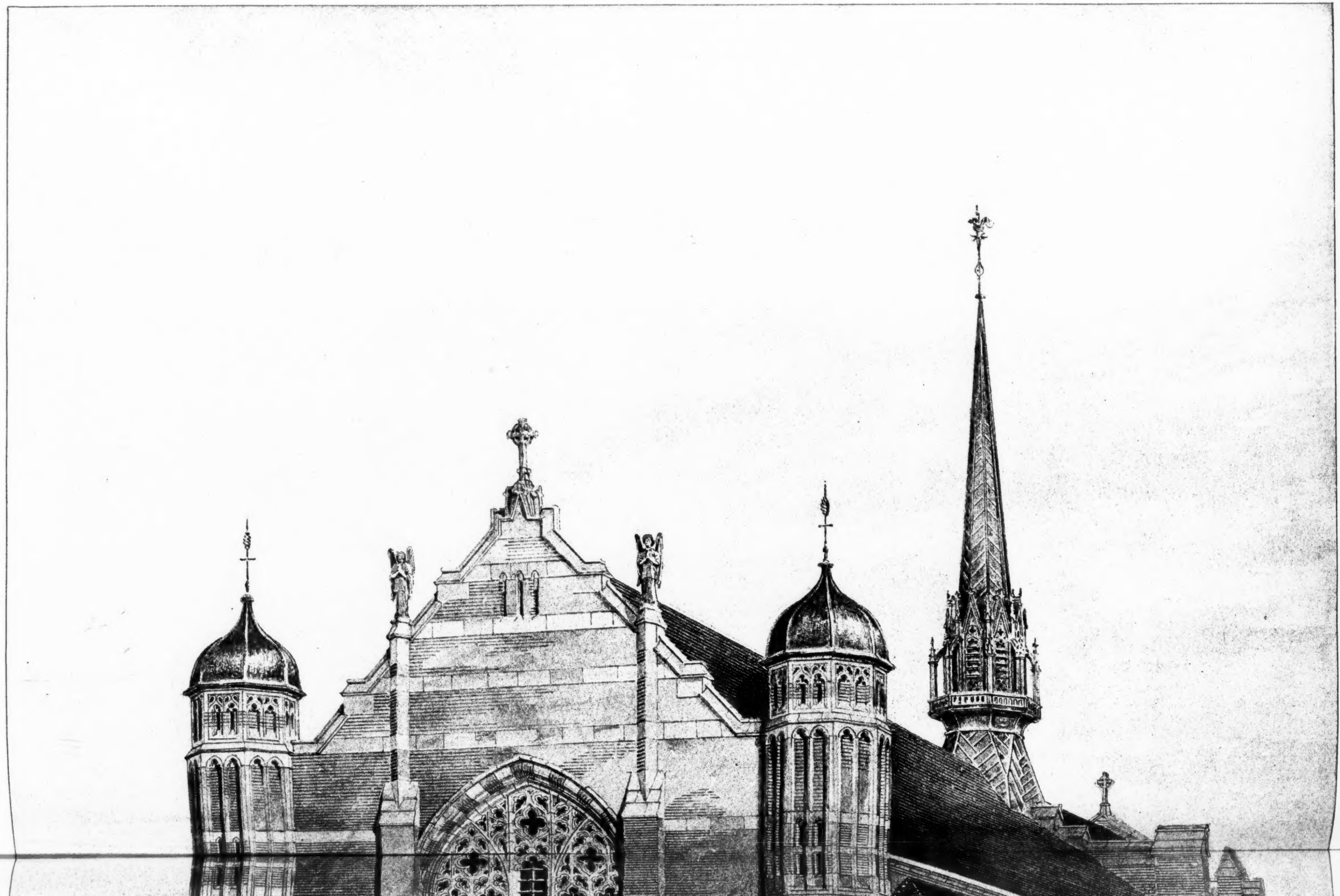

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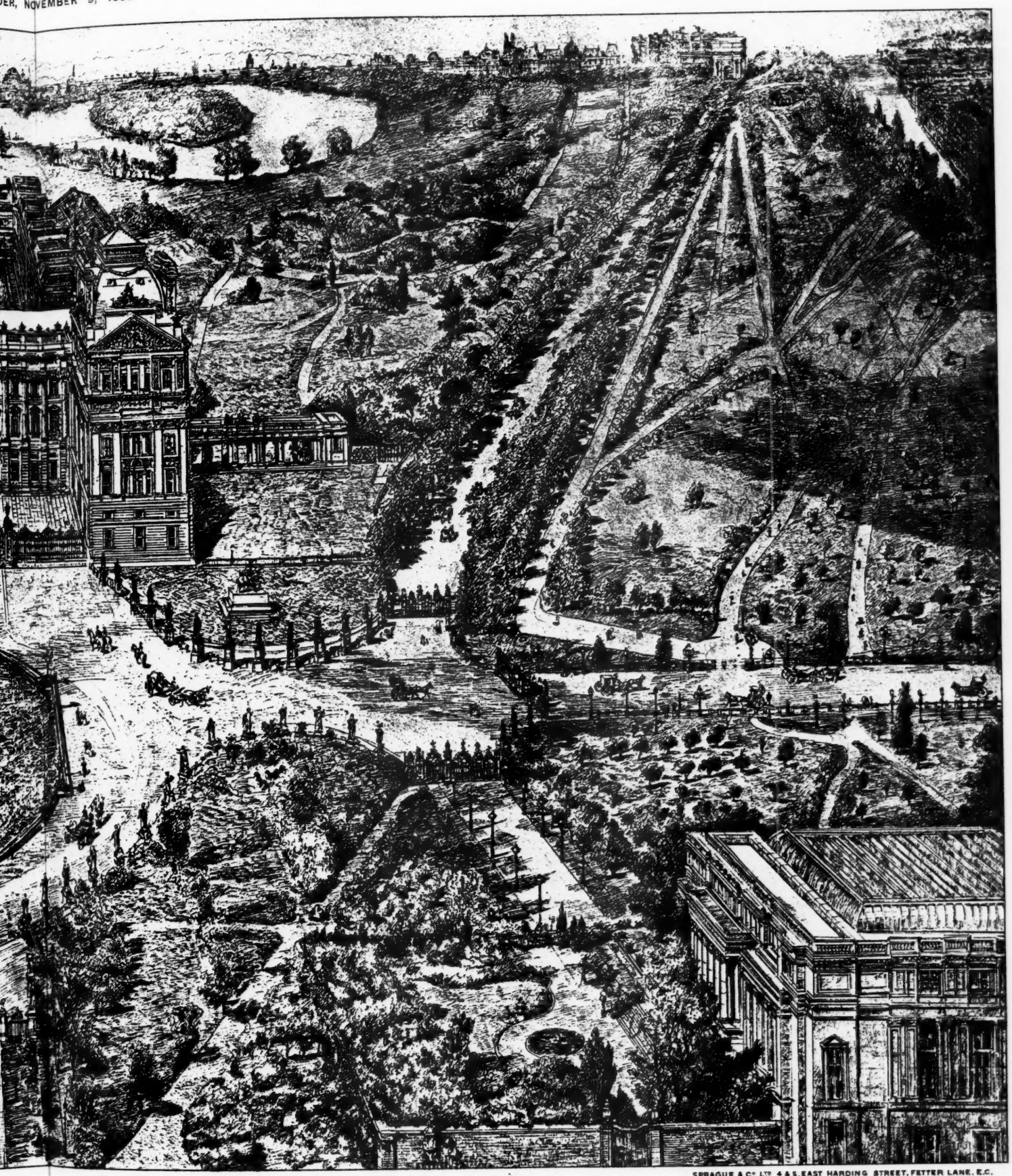
EXTERIOR.

BIRD'S-EYE VIEW OF SCHEME FOR THE TREATMENT OF THE FAÇADE OF BUCKINGHAM

THE QUEEN VICTORIA MEMORIAL

By SIR THOMAS DREW,



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HOMAS DREW, R.H.A.